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Consciousness and Time

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Abstract

This thesis investigates how time structures consciousness and consequently how consciousness structures time. This broad question will be examined across three sections and three experiments.

I. The first section introduces phenomenological methods and includes an experiment using a standardized task to compare two of the most established methods—Descriptive Experience Sampling (DES) and micro-phenomenology. DES involves interviewing participants about experience that occurs directly preceding random beeps. Micro-phenomenology involves interviewing participants by creating an evocation state of a past experience. Here we examine both methods using a mental imagery elicitation task. As a result, DES and micro-phenomenology reveal different aspects of experience. Temporal scope is a major factor for these differing aspects. How then can altering temporal scope reveal new facets of experience?

II. The second section establishes a new method: dynamic Descriptive Experience Sampling (dDES). This method adds a more direct temporal dimension to DES. Instead of asking about just one moment before the beep, here we ask about two moments, as well as the temporal relation between these moments. Results include a variety of such temporal relations, which can then be grouped into categories (e.g. transformation, overlapping). Temporal experience is different for each participant. For example, for some participants, experiential elements carry across multiple moments. For others, elements most often switch from moment to moment. Results often buck phenomenological assumptions, like the continuity hypothesis, that our streams of thought are unbroken and without gaps. How can this method be useful to the rest of cognitive science?

III. The third section applies our findings to broader philosophical concerns and includes an experiment testing dDES with an established psychological study—the Libet task, investigating free will. This task involves participants freely choosing when to press a button. Neuroactivation precedes the reported time of free decision. What are participants' experiences like over time courses that correspond to this neural activity? Results include findings that may challenge phenomenological assumptions of the Libet setup, for example the assumption that there is nothing leading up to a decision before its reporting.

The first section surveys the scope of existing methods. The second section introduces a new method to investigate temporal experience. The third section shows the applicability of our new method and helps assess its validity. We then address further philosophical concerns, including existing models of temporal consciousness. The data presented here cement the need for new models.

Kurzzusammenfassung

Diese Arbeit untersucht wie Zeit Bewusstsein strukturiert und in Folge dessen, wie Bewusstsein Zeit strukturiert. Diese breitgefächerte Frage wird innerhalb drei Abschnitten mit insgesamt drei verschiedenen Experimenten untersucht.

I. Der erste Abschnitt stellt phänomenologische Methoden vor und beinhaltet ein Experiment mit standardisierten Aufgaben um zwei der etabliertesten Methoden zu untersuchen – Descriptive Experience Sampling (DES) und Mikrophänomenologie. DES baut auf Interviews über die Erfahrung & Warhnehmung der Teilnehmen genau vor einem Piepston auf, der zu zufällig gewählten Zeiten erklingt. Mikrophänomenologie baut darauf auf, dass Teilnehmen in Inverwiews eine vergangene Erfahrung wiedererleben. Daraus resultiert, dass DES und Mikrophänomenologie unterschiedliche Aspekte der Wahrnehmung freigeben. Der zeitliche Bereich nimmt dabei eine zentale Rolle in diesen unterschiedlichen Aspekte ein. Wie kann eine Veränderung des zeitlichen (Wahrnehmungs-)Bereichs neue Facetten der Wahrnehmung darbringen?

II. Der zweite Abschnitt etabliert eine neue Methode: Dynamisches DES (dDES). Dadurch erhält diese Methode einen direkteren Bezug zur zeitlichen Wahrnehmung. Anstatt nur einen Moment kurz vor dem zufälligen Piepston zu erfragen, werden sowohl zwei verschiedene Momente erfragt, als auch die zeitliche Verbindung zwischen diesen beiden Momenten. Anhand der Resultate lassen sich unterschiedliche zeitliche Beziehungen ablesen, die sich in weiterer Folge in unterschiedliche Kategorieren einteilen lassen (z.B. Transformation, Überschneidung). Zeitliche Erfahrungen unterscheiden sich bei allen Teilnehmenden. Beispielsweise ziehen sich einzelne Elemente bei manchen Teilnehmenden über verschiedene Momente hindurch. Bei anderen wechseln solche Elemente von Moment zu Moment. Einige Resultate widersprechen phänomenologische Annahmen, wie die Kontinuitätshypothese, die besagt, dass unsere Gedankenströme lückenlos und ununterbrochen stattfinden. Wie kann diese Methode also hilfreich für restliche Felder der Kognitionswissenschaft sein?

III. Der dritte Abschnitt verbindet die untersuchten Resultate mit breiteren philosophischen Überlegungen und bringt ein Experiment mit der dDES-Methode mit einer etablierten pyschologischen Studie – dem Libet Experiment zum freien Willen. Dieses Experiment lässt Teilnehmende frei wählen, wann sie einen Knopf drücken. Neuronenaktivierungen zeigen eine Reaktion (das Bereitschaftspotential) vor der aufgezeichneten Zeit in der eine freie Entscheidung getroffen wurde. Wie verhalten sich die Erfahrungen der Teilnehmenden zu den zeitlichen Momenten, in denen das Bereitschaftspotential festgestellt wurde? Die Resultate legen Ideen nahe, die einigen phänomenologischen Annahmen des Libet-Experiments widersprechen könnten, z.B. der Annahme, dass es im Vorfeld nichts gäbe, dass zu den Entschiedungen führt bevor sie aufgezeichnet werden.

Der erste Abschnitt untersucht die Reichweite der bestehenden Methoden. Der zweite Abschnitt stellt eine neue Methode vor um zeitliche Erfahrungen zu erforschen. Der dritte

Abschnitt zeigt die Anwendungsmöglichkeiten dieser neuen Methode und hinterfragt ihre Aussagekraft. Anschließend befasst sich diese Arbeit mit weiteren philosophischen Überlegungen, u.a. den bereits bestehenden Modellen zum zeitlichen Bewusstsein. Aus den vorgestellten Daten geht die Dringlichkeit neuer Modelle hervor.

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1. Years, Days, and Moments

Consciousness and time are deeply intertwined.

Consciousness is arranged in time. If you are like the participants in this thesis's research, your thoughts have temporal extension. As you read this sentence, your experience of it is probably extended over time. When you hear a melody, you probably experience duration, succession, and change. Ah—*probably*. Why this timid lack of certainty? We'll see that with experience research, we can't take anything for granted. Hence this thesis's deep dive into what temporal consciousness *is actually like* for individuals—research often lacking from philosophical discussions and neuroscientific probing.

What's more mind-warping than time structuring consciousness is that consciousness may also structure time. This is the anthropocentric view of time supported by physicists from Reichenbach (1956) to Rovelli (2018). We experience the universe as moving towards increasing entropy or disorder, and this constitutes the flow of time. But this ordering might have less to do with the actual state and order of the universe than with our consciousness itself. Memory formation, a property of most human consciousness, must operate in such a way that it increases information, which is equivalent to increasing entropy. So the ordering of the universe towards ever-increasing entropy might just be because this is how the very consciousness perceiving it must necessarily be arranged. As Price puts it, "the asymmetry of causation is a projection of our own temporal asymmetry as agents in the world" (1996, p. 246). So again, we experience the universe moving towards increasing entropy because this is the only ordering that allows for experience. But the universe itself might be indifferent to this flow of time from past to future. Leading theories in physics indicate a block universe where all time—past, present, and future—can be said to exist equally (Price, 1996; Dainton, 2010).

These are by no means the only physical theories of time, but they are intriguing ones. And going by these, consciousness and time are a bit like a chicken giving birth to an egg containing that very same chicken. How do we make sense of the complex imbrications of these two entities? How do we turn this all into an edible omelet?

You can look at the interactions of consciousness and time at many different scales. For example:
-The effects that neural dynamics have on experience, on the level of a few milliseconds.
-Shifts in consciousness from one moment to the next.
-Changes in thought and mood over the course of a day.
-Circadian cycles of sleep and wakefulness.
-Effects of memory, relationships, and drives over a person's lifetime.
-The narratives we form out of our experience in order to inform identity and worldview.
-How cultural mindsets change over the course of history.

You'll get *very different results depending on the scale* of your investigation. Scale in the sense of, say, whether you're examining one second of inner experience, or broader changes throughout days or years of experience. Results will look different from one temporal scale to the next. As Ralph Waldo Emerson wrote, "Years teach much which the days never knew" (1844/2000, p. 550). To adapt his quote to phenomenology, you'll see results on the scale of years which are not apparent on the scale of days.

Here the level we're mostly concerned with is what E. Robert Kelly calls the "specious present" (as cited in James, 1890/1983, p. 573).[1] This present moment is 'specious' or fictitious because it's actually of the recent past—the time it takes for a stimulus to present itself to our consciousness. Psychophysics research suggests it can take from 50ms up to 500ms, depending on the stimulus, or interpretation of the data (Pockett, 2002, 2003). However, in our consciousness, the specious present is experienced as a constant now. And now. And now. James defines it as "the short duration of which we are immediately and incessantly sensible" (p. 594).

This is a very central explanatory level, 'central' defined recursively by how our lives and perspectives are centered. But perhaps because of this centrality, our direct experience is often ignored. When we convey our experience—to friends, in writing, or even reflecting on it to ourselves—we rarely focus on direct experience. We generalize. We average across time. We select and heighten certain occurrences while ignoring others. Even though our lives take place solely in the time of the specious present, we don't know much about it, since by looking backward it dissolves, like a dream once you wake up.

It's in order to provide basic definitions of our two main terms. The term 'consciousness' has been used in a variety of ways, sometimes synonymously with related terms like experience, inner experience, subjective experience, awareness, attention. I'll adapt Nagel's definition to say that a conscious state is one where *there is something that it is like* to be in that state (1974). The term can elicit confusion—some people use 'consciousness' to designate self-consciousness, or a higher level of reflexiveness or awareness. I mean something more basic—conscious states are simply states involving some subjective dimension.

Consciousness, inner experience, and experience are the terms I'll use most and will use interchangeably for the sake of simplicity.[2] Sadly we'll only be dealing with human

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[1] William James popularized the expression in his Principles of Psychology, citing Kelly's pseudonym E. R. Clay. It should also be noted that Shadworth Hodgson developed the doctrine of the specious present independently and before Kelly (Anderson & Grush, 2009).

[2] Qualia is another term often used, but can beget misunderstandings. For example, some speak of the qualia of redness—e.g. the redness of an apple (Ramachandran & Hirstein, 1997). But this implies that this redness is something that can be separated from the rest of experience. Researchers like Hofstadter (2007) criticize this. In addition to problems of separability, the term 'qualia' runs into problems of divisibility. If qualia is plural, what is a quale? There's no clearly established answer. For these reasons, I won't use the term in this thesis.

consciousness in this thesis. It's not possible to use phenomenological methods with non-human animals at the moment. But let's hope for some methods in the future!

On to time. 'Time' is the most used noun in the English language but is notoriously hard to define ("The popularity of 'time'", 2006). In 400 CE, St. Augustin reflected on the challenges of providing a definition: "Provided that no one asks me, I know. If I want to explain it to an inquirer, I do not know" (400/1991, p 513). Definitions can involve changing states of entropy, a measure of motion, a measure of change, or even an abstraction non-existent in any physical substrate (Buzsáki, 2006). Different definitions are used for different paradigms (quantum vs. classical mechanics, for example). For now, we can use a circular but practical definition: time is what clocks measure. Interestingly, this definition privileges constructs of human culture; instruments used to organize human activity and experience. The question of how psychological and physical time relate is one we'll return to in later chapters.

So combining these two terms, we get 'temporal consciousness'—how our consciousness develops and shifts over time. This relation has been a pressing topic for centuries. Roughly 1600 years ago, St. Augustine wrote his *Confessions* proposing that the only existing time is the present moment. This doctrine came to be called presentism. Subsequent philosophy has dealt with how experience and time relate, including the phenomenology of Husserl, Dainton, and others (e.g Husserl, 1928/1991; Dainton, 2010). Psychology and neuroscience explore the topic, relying on various tasks including duration estimates. And we can't forget the clinical side of psychology, developing a body of knowledge that often isn't integrated with experimental psychology.

In this thesis, we'll combine the in-depth consciousness exploration of phenomenology with the attempted empirical rigor of the psychological sciences. This combination of approaches is what Kordeš dubs 'empirical phenomenology' (2016). To best examine temporal consciousness, I've adapted an existing method, Descriptive Experience Sampling (DES), to devise a new method I call dynamic Descriptive Experience Sampling (dDES). The original DES method is one of the most rigorous methods for exploring inner experience. But it is unable to answer certain basic questions about how experience is arranged over time. Hurlburt (the method's founder) and Heavey write that they don't know if experience is composed like a stream or like a series of beads on a string (2006, p71). Is it continuous or a series of disjunct moments? Other introspective methods are better suited to address temporal questions but may lack the precision of DES.

Descriptive Experience Sampling involves probing a participant with random beeps throughout the day. The participant jots down notes on experience that directly precedes each beep. This is followed by an extensive interview on each of the sampled moments, to

weed out the participant's and interviewer's presuppositions and determine what exactly was in experience before each beep (Hurlburt & Heavey, 2006).

With dDES we look at not just one but two moments directly prior to each beep. We also look at how these moments relate to each other. In short, the goal is to examine temporal experience with as precise a scope as possible.

Let's look at a sample. But first, please 'bracket' your own presuppositions about what experience is like. Experience for others may be radically different from your own, and you shouldn't use your own experience as a metric of validity.

Adrien sample 5.5

<u>Moment 1</u>

Adrien has a mental image of a steak made of seeds (a vegan steak). However, this is more the idea of an image than an actual image. There are details to it. The image is 3D and the steak is round, with pieces of seeds in brown and green shades. But it's missing information that would make it explicitly visual. <u>Coding</u>: Imageless seeing

<u>Moment 2</u>

Adrien hears a mental echo of his friend Lennart's sentence "do you know what 'erbse' is?" ['erbse' meaning peas in German]. But this sentence isn't extended temporally. It's like "the whole sentence is contained at every instance." And this sentence is "holding still in time." Adrien used the metaphor "like looking at the sun, and the sun stays in your vision after." So the whole sentence is contained at every instant, extending through time.

Adrien also has an additional component of his understanding of the sentence increasing. Adrien understands Lennart to be asking if he knows what seeds meant, to describe a vegan steak (however, since 'erbse' means peas, not seeds, Adrien probably understood incorrectly). In any case, this is an un-worded understanding. It is separate from the hearing part. <u>Coding</u>: Inner hearing, Unsymbolized thinking

<u>Temporal</u>

Adrien started Moment 1 with the image already fully formed. He couldn't provide detail for how it was formed, besides it being "probably rather instantaneous."

Adrien wasn't sure when the inner hearing aspect came in. He didn't at first report it for the farthest moment (Moment 1), but in the interview, he noted it was probably already there. It was constant at first but then disappeared as Adrien understood the meaning. He wasn't sure how it disappeared)

The image faded out as the understanding increased. Fading for the image was literal, even though the image lacked visual properties.

The understanding increased quickly in Moment 2.

<u>Coding</u>: Crossfade (image to understanding), Overlapping / altering (sound)

Fig. 1
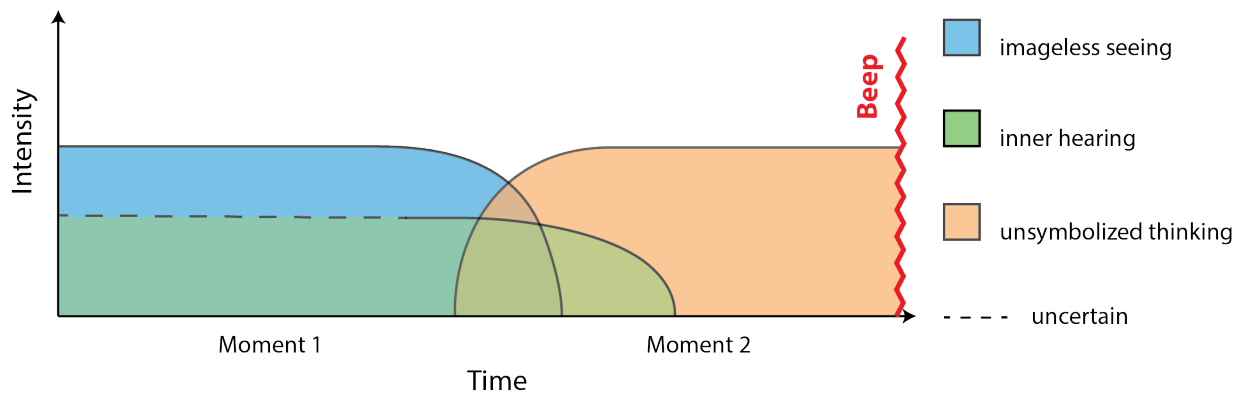
Time in this sample and others doesn't conform to certain presuppositions about temporal consciousness. For example, we normally think of a sentence as having temporal extension. But here a sentence is contained in its entirety at every instance. It 'holds still' over time like an afterimage from the sun. Is it difficult to wrap your head around what exactly this entails? Or does it buck your presuppositions of experience? This discomfort can occur when we confront another person's direct experience. We can encounter unfamiliar turf. We often think of sentences as conveying some kind of change—change in meaning, or change in sounds at least. Here a sentence is unchanging, like a solid object. Yet it extends over time—time itself which could be conceived as a measure of change.

Other elements of experience here might also be unfamiliar. For example, imageless seeing. Adrien has an inner image of a vegan steak. But it's lacking information to make it explicitly visual. There are still details to it. It's 3D, the steak is round, and with green and brown seeds sticking out. Yet it's lacking characteristics that make it explicitly seen, even as a mental image. Note that this isn't just a distinction between mental images and actual visual perception. Many other participants in this thesis and in other DES research do have mental images that are explicitly visual (Hurlburt, 2011). Some are even quite vivid—an arm with vivid blue and red veins for instance (Lara Sample 2.1). Adrien simply didn't have an explicitly visual component to this image and many of his other images. Examining what exactly are the properties of experience and how they change over time is the overarching goal of this thesis.

We can group various kinds of temporal experience into categories. Here the image fades out as the understanding of the sentence increases. We can call this a 'Cross-fade' since one element disappears while another one enters.

For this method to stay rigorous we must note limitations. Adrien thought the inner hearing of "do you know what 'erbse' is" occurred for Moment 1 as well as Moment 2. But we can't be entirely sure. If it was at Moment 1, then we could label this as another temporal pattern—Overlapping. In this case, one experiential aspect overlaps across two moments.

The dDES method is the main basis of this thesis. We'll delve into what exactly this method is, how it works, and what new insights it offers. But before this, we'll discuss and compare other phenomenological methods and see how they address time. We'll look at an empirical study comparing two of the main methods—micro-phenomenology and DES. Once we've set the stage and discussed the state of empirical phenomenology, we can then turn to dDES, including extended case studies of five individuals. These studies show the diversity of how our experience develops over time. People have very different ways for how one element of consciousness transitions to another. By 'element' I mean a component of consciousness that cannot easily be subdivided. The imageless seeing of vegan steak is one element. The growing understanding of the sentence is another element. Elements can gradually fade or shift abruptly. They can shift rapidly within a short period of time, or they can stay stable for long periods. They can overlap, or they can remain discrete, occurring one after the other. They can break off in permanent ruptures, or disappear leaving the possibility of return as if they're continuing in parallel. They can increase in presence without increasing in intensity. Or there can be breaks in consciousness, absence of any experience at all.

The world of conscious experience is largely unexplored. Even an initial investigation with a new method reveals uncharted seas and virgin soil. Many dDES results differ from results from all other phenomenological methods. They also differ greatly from "armchair introspection" (Hurlburt & Heavey, 2006, p. 20) referring to when theorists speculate about the nature of experience without empirical investigation, from the comfort of their armchairs or other seating arrangements. As flawed as this method is (and we'll examine the biases and distortions it can lead to), it has actually historically been the chief method of phenomenological research. It's time for a change.

To see how stunted consciousness research has been, imagine another field where researchers form theories by asking: what is my experience like? Imagine an anthropologist who says: "in my culture funerals are somber affairs, where people wear black, speak in hushed tones, and cry a lot. Therefore, funerals are like this in all cultures." Obviously, this is not in case. In some Asian cultures, white is the color of mourning (Shuang, 1993). And in New Orleans jazz funerals, the marching band procession music gets increasingly joyous (Coclanis & Coclanis, 2005). But perhaps this metaphor is too kind even. At least our hypothetical anthropologist gets to look at other people around him. Consciousness is even more fickle. Numerous studies and metastudies (for example Nisbett & Wilson, 1977) show that we can often be mistaken about our own subjectivity, due to cognitive biases and memory issues. Perhaps our consciousness scientist is more like a hairdresser cutting his own hair without a mirror. And then saying, "since my hair looks like this, everyone's hair should too." We'd all be walking around with assymetrical haircuts with patchy bald spots. It's a wonder that consciousness science has progressed for so long in this way.

But this isn't to place all the blame on consciousness science. Mainstream experimental psychology and cognitive science have largely ignored consciousness. Of course, it is often inferred—from behavior, neural activity, pupil dilation, cognitive models, and a host of psychometric tools. Questionnaires can ask about conscious experience, but usually not about direct occurances. They ask participants to generalize, estimate, and interpret their experience. 'How much of your day is occupied by X type of thoughts' (e.g. the Yale-Brown Obsessive Compulsive Scale, Goodman et al., 1989). Conscious experience is the target of such questions, but only indirectly. Participants first have to undergo mental processes that may involve thinking back on remembered experience, choosing salient moments, interpreting them, estimating a frequency, etc. This isn't to knock the utility of such questionnaires. Just to say that they're removed from consciousness as it unfolds in our specious present.

Consciousness was, however, a core part of psychology at its inception. In the next chapter, we'll go into what went wrong, leading to the decline of introspection in psychology in the early 20th century. Since then psychology has had a limb missing. It deals with consciousness but only through its shadows—from its physical instantiations, the behaviors it leads to, or the responses it elicits. It contents itself with these shadows out of the belief that consciousness is either trivial and easy to understand, or else impossible to reliably investigate. What if neither is true?

Here we put the focus back on consciousness, especially regarding our experience of time. Rigorous empirical methods can offer new insights into temporal consciousness. With dDES I hope to continue the project integrating phenomenology with experimental psychology. Psychology can no longer ignore the importance of consciousness. And phenomenology can no longer ignore the standards and procedures of scientific research.

<center>❋❋❋</center>

First, let's review some of the psychological literature concerning consciousness and time to situate our investigation. We'll draw from a wide range of perspectives, from developmental psychology, to cognitive neuroscience, and even psychodynamics. This is not to say that some of the research presented here won't be falsified in the future. Simply, this is the state of research as it exists—an assemblage of its heterogeneous faces. We'll see how the diligent study of consciousness can clarify current research.

Development

Understanding of time isn't present at birth. It's learned. Piaget found that understanding of time as an abstract concept emerges in adolescence (1927/1969). Before that, our conception of it is patchwork. For instance, some children think tearing off sheets of a calendar brings about actual advances in time (Werner, 1957). Before time is understood, it

exists only embedded in the context of action. The consensus from a psychoanalytic perspective is that our most basic understanding of time comes from the periodicity of physiological processes like sleep and hunger (Colarusso, 1988; Gifford, 1960).

When concepts of time are learned, they're not all learned at once. A child may have a different age for learning about duration, causality, past and future, sequences of events, and differentiating space and time (Chapman, 1997; Friedman, 1990).

Time's illusions

Once learned, time can still be slippery and illusory. It speeds and slows. Virginia Woolf observed,

> "Time, unfortunately, though it makes animals and vegetables bloom and fade with amazing punctuality, has no such simple effect upon the mind of man. The mind of man, moreover, works with equal strangeness upon the body of time. An hour, once it lodges in the queer element of the human spirit, may be stretched to fifty or a hundred times its clock length; on the other hand, an hour may be accurately represented on the timepiece of the mind by one second." (1928/2006, p. 207)

This stretching and contracting is such a universal occurrence that it's entered into cliché. Time flies when you're having fun. It drags when you're at work.

Experimentation has backed this up. Certain stimuli can also stretch or contract perceived duration. With the oddball effect, novel stimuli lengthen perceived duration (Tse et al., 2004). Pleasurable stimuli are perceived as lasting for a shorter duration (Gable & Poole, 2012). Emotions can affect perception of time. Anxiety and fear lengthen time estimates (Watts & Sharrock, 1984). Awe can inflate sense of time availability (Rudd et al., 2012).

Perception of time can also change with activity. Interacting with other people on a task can make time pass more quickly. It can also produce consensus on pace of time within the group (Conway, 2004). Group members' duration estimates decrease in variance. Also, people who enjoy a task can enter a state of 'flow' where time is altered. Some even lose sense of time. We can say that they lose a sense of explicit time, while still retaining implicit time (Csikszentmihalyi 1990).

For the purposes of this thesis, explicit time is being directly conscious *of* time. Implicit time is simply consciousness *in* time.[3] For an example of explicit time, imagine you're thinking 'time's passing so slow, there's still half an hour until I can eat lunch.' You're directly aware of time. For an example of implicit time, say you're just eating lunch, and thinking about your kiwi. This is something that takes place in time, but you're not explicitly aware of time. This distinction will be useful as we continue our review.

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[3] To avoid confusion, note that implicit and explicit time can sometimes have other meanings in other discussions on the psychology of time.

Time perception can alter depending on psychopathology. A meta-analysis of time perception in schizophrenia found overestimation of intervals, so an acceleration of the internal clock (Ueda et al., 2018). Depressed people report that time passes more slowly than non-depressed people (Hawkins et al., 1988; Thönes & Oberfeld, 2015). However, this is based on subjective reports. When estimating the objective passage of chronometric time (estimating the length of an elapsed interval), there are no significant differences between the groups.

There are likely different mechanisms for subjective experience of time and objective measurements. Or subjective reporting of time is based on retrospective estimates and involves turning implicit time into explicit time.

Time perception can also change in abnormal conditions. People in conditions without sunlight and habitual circadian rhythms underestimate the amount of time spent. For example, Véronique Le Guen spent 111 days in isolation in a cave but thought that only 43 days had passed (August, 1988).

Time can slow in life-threatening situations like robberies and traffic accidents (Eagleman et al., 2005). One race-car driver flipped his car 30 feet in the air while traveling 100 miles an hour. He reported:

> "It seemed like the whole thing took forever. Everything was in slow motion and it seemed to me like I was a player on a stage and could see myself tumbling over and over in the car. It was as though I sat in the stands and saw it all happen." (Noyes & Kletti 1976)

Does time really pass slower in conditions of fear? Stetson and colleagues (2007) tested time perception while participants fell backward 31m. They tested visual resolution by participants' ability to discriminate numbers on a fast-flashing screen. Participants were no better at such discrimination than those in the control condition. So visual resolution was not increased. However, participants did overestimate the time of their fall. The researchers argue that for fear-inducing events, we don't really have increased temporal resolution but we do have denser memory encoding. We retrospectively estimate these events as lasting longer, even though our temporal experience wasn't stretched during the event itself. So time doesn't really slow, we just remember more. These findings may apply to people who undergo car crashes and other extreme circumstances.

But it's still worth questioning the phenomenological assumptions of experiments like these. Is visual resolution an appropriate stand-in for temporal experience in general? It's possible that the resolution of experience could increase even if visual resolution doesn't. Perhaps our vision can remain the same while the rest of our thoughts quicken—on the 31-meter fall we could think about the time we fell off a tree as a kid, being rushed to the hospital, the months spent with a cast on our leg, OH SHOOT what if this bungee cord breaks? WHAT IF I DIE? This could all come at a pace much faster than our habitual

trains of thought. We can't assume what someone's conscious experience necessarily reflects other measures like their visual resolution. Phenomenological methods should be integrated with psychological tasks whenever possible.

Findings like Stetson et al.'s leave the waters of temporal experience murky. It is clear, however, that our sense of the past is largely determined by how memories are encoded. For example, many during SARS-CoV-2 lockdowns had the impression that time passed slowly in the moment, but when looking at the past, it whizzed by (Hammond. 2020). Flaherty (1991) argues that with high or low stimulus complexity, time passes slowly. Times in lockdown often involve low stimulus complexity, so when we make explicit time judgments during the day, we perceive time as passing slowly. But then why does the more distant past pass quickly? Experts hypothesize that because of the sameness of the days, fewer memories are encoded. The past then seems to pass faster than usual (Hammond, 2020).

William James observed this phenomenon pre-Covid, writing, "In general a time filled with varied and interesting experiences seems short in passing but long as we look back. On the other hand, a tract of time empty of experiences seems long in passing, but in retrospect short" (1890/1983, p. 587). James used this argument to explain why the same duration of clock time is experienced as shorter for an older person than a younger one. For the younger people, it's more vivid, more of it clings to our memory, and we estimate the duration as longer. More recent research backs up the fact that older individuals experience time to pass faster as they age, especially when evaluating the previous 10 years of their lives (Wittmann & Lehnhoff, 2005).

Now is a good opportunity to look back on the findings presented, and reflect on how heterogeneous they are. We infer sense of time from measuring speed of visual perception (Stetson et al., 2007), estimates of short durations (Watts & Sharrock, 1984), of long durations (August, 1988), by comparing a stimulus to other stimuli (Tse et al., 2004), and by questionnaires asking people how they experience time (Rudd et al., 2012). Different neural mechanisms may be involved at different scales. And as we've seen, estimates of duration may rely on retrospective evaluation and so on the density of memory encoding (Stetson et al., 2007).

How does this retrospective evaluation relate to how time passes in the specious present? From the distinctions we've made, retrospective evaluation requires taking implicit time and somehow turning it into explicit time. The mechanisms behind this are not well known. We cannot assume that these explicit time evaluations say anything about how implicit time is experienced.

For example, consider the results with depression, where chronometric time estimations were unchanged, but subjects said that they subjectively perceived time to be passing

slower (Hawkins et al., 1988; Thönes & Oberfeld, 2015). What is this subjective perception? Perhaps time really does pass slower for depressed individuals. Or perhaps these subjective reports involve turning implicit time into explicit time, and in doing so creating an impression of the slow passage of time. It may involve thinking back on a period that elapsed, selecting salient moments, averaging others, creating a general impression, etc. We simply don't know the processes at work here. That's where phenomenology comes in. What *is actually going on* in experience?

If all this is confusing, apologies! We're presenting findings at the same time as we're pulling them apart. Eagleman (2010) argues that time perception is not one thing. Different sensory modalities may simultaneously keep track of time in different ways. Time can be different things on different scales, and the mechanisms behind sub-second timing are very different from the cognitive mechanisms behind timing of longer scales, such as seconds minutes, and months. As Lee puts it "in terms of the metaphor of 'flow', it is more like there are many inter-connected streams rushing noisily and unevenly at approximately the same speed, rather than one single smooth stream" (p. 159).

Individual and cultural differences

So far, we've looked at the development of time concepts, and illusions of time, as these manifest for most people. Differences in time perception can also mark individual and cultural differences. Some psychologists, for example, judge personality in relation to how people approach time. You've probably heard of type A and B personalities. Type A people are competitive, work-focused, and more conscious of time and punctuality. They also have elevated rates of coronary heart disease (Friedman & Booth-Kewly, 1987). However, note that this research is controversial (including the tobacco industry's role in findings) (Petticrew et al., 2012). Friedman (1990) distinguishes groups of people who see time as a short span where pleasure should be seized, and those who see time as the "tug of future rewards that make present self-denial worthwhile" (p. 120).

As far as cultural differences, there is indeed great variety in the perception and measurement of time. For example, the Ainu people of Hokkaido, Japan, traditionally have no clear counting of days but do have lunar cycles. They also mark different parts of the year—like trapping season. They divide the day into light day and dark day. Light day is for humans. Dark day is for the gods and demons, and it's taboo to venture out at this time. It's even taboo to use certain words at night (Ohnuki-Tierney, 1973).

We can also look at how Australian aboriginal cultures deal with time. It's tricky to group these diverse cultures together, but nonetheless there are commonalities. Indigenous Australians don't conceive of time as linear. They believe in Dreamtime, a time when the Gods created the earth and its landforms and inhabitants (Morphy, 1999; Gallois, 2007). Gods emerged from the ground and formed caves. Or they walked over the land and

formed rivers. But this time isn't simply in the past. It's an eternal time parallel to our own experience. Past, present, and future all exist within Dreamtime. Actions that people undertake in the present are ripples of actions from this Dreamtime. Time is also not separate from space. Indigenous Australians created songlines to navigate their surrounding territories. These songs tell the stories of the Gods' actions during Dreamtime and can be used to walk vast distances over the land, recognizing landforms, mountains, watering holes, and other markers. The temporality of Dreamtime is then connected to the navigation of space.

These are just two examples of how marking of time can differ greatly across cultures. Pace of life can also differ. Cultures with high industrialization and individualism are correlated with a faster pace, including walking speeds (Conway et al., 2001; Levine, 1997). Approaches to punctuality can differ as well, with cultures having very different standards for what's considered 'late.' (Van Eerde & Azar, 2019)

Languages vary as to how they handle time. Some lack temporal connectives like 'before and after' (Bohnemeyer, 2002). Others mark different temporal reference points (deictic centers) in verb tense, lexicon, and other parts of speech (Núñez & Cooperrider, 2013). Think about the future perfect progressive tense in English: 'by the year 3000, aliens will have been ruling our planet for 100 years.' We're shifting our reference point to the future, to talk about what the past will look like then. We're talking about the past in the future.

Do different individual or cultural conceptions of time entail different temporal experience on the granular level of the specious present? This is certainly an area for future research, which our dDES method could help illuminate.

Time and space

Cultures can also vary in how they conceptualize time spatially. Across all cultures, however, there is at least some aspect of understanding time in terms of space. There are no systematic reports of a culture that lacks spatial construal of time altogether (Núñez & Cooperrider, 2013). Some pre-industrial cultures may, however, have spatial construals that aren't as stable as in post-industrial groups.

An example of a common spatial construal of time is that modern 'Western' cultures usually point backward to indicate the past. The past is understood as extending in a line behind us. However, the Aymara people of the Andean highlands point in front to designate the past. The past is knowable and what's knowable is in front (Núñez & Sweetser, 2006). The Yupno people of Papua New Guinea point at whatever direction is uphill to indicate the future. For example, if there's a hill to the right, they would point to the right. This isn't a straight line either but follows the topology of the surroundings. The future involves a march uphill (Núñez et al., 2012).

Cultures can also have different spatializations for writing—English, for example, progresses left to right. For the Hebrew, the order is right to left (Núñez & Cooperrider, 2013).

Links between time and space go beyond handy metaphors. The two domains are also linked in perception. With the kappa effect, the distance between two stimuli has a profound effect on people's judgment of the amount of time between them (Kuroda et al., 2017). If two stimuli are farther apart in space, we perceive them as farther apart in time. Another study found that the spatial experience of riding a train influenced answers on a temporal reasoning task (deciding whether 'moving Wednesday's meeting forward' put it on Monday or Friday) (Boroditsky & Ramscar, 2002).

Spatial reasoning influences temporal reasoning, but temporal reasoning does not influence spatial reasoning to the same extent. The relationship is asymmetrical (Boroditsky, 2000).

Space and time are linked in the brain, as well as in perception. There are similarities in regions that process and create these properties. Grid cells in the hippocampus that process space also process time (in rats at least, Kraus et al., 2015). Time and space are linked in physics, with the most accepted model fusing them into four-dimensional spacetime. Perhaps modern Western separation of time and space is not a default mode of experience but a product of social construction. As mentioned, some cultures, like Indigeneous Australian ones do not stress this separation. Our brains don't make a neat separation either. We fuse time and space, using common regions to process both.

Time and the brain

On that note let's transition to investigating the neuroscience of time. At this level of explanation, we're far from having all the answers. Different neural mechanisms operate at different scales—from the timing in milliseconds required to understand the subtleties of language, to the timing required to execute an action, to the timing of our circadian clocks. Certainly, some regions recur across experiments—the cerebellum, the prefrontal and parietal cortices, the supplementary motor area, and the basal ganglia (Grondin, 2010).

What's hotly contested is how these various scales of time-keeping are coordinated. Some theories propose a central internal clock. This could for instance be an oscillator that adapts to the environment and is shaped by events (Jones & Boltz 1989). Or a pacemaker that emits pulses which can be used for duration estimates (Weardon, 2003). For the simplest metaphor, think of an internal clock that structures our inner activity, just as a regular clock structures our external activity.

In other theories, different sensory modalities conduct their own timekeeping (Jantzen et al., 2005). For example, visual timing is processed in visual parts of the brain. Auditory timing could be processed in auditory regions and so on.

A final theory we'll examine is that the brain is, at its core, a timekeeper (Buonomano & Merzenich, 1995; Buonomano, 2017). Keeping time is an implicit part of its functioning. Any neural sequence is extended over time and leaves a specific spatial code. The way the network evolves through time can code for time itself. Spatiotemporal patterns act as timers. For a perhaps more elaborate metaphor, imagine a bunch of animals representing neural activity running around a forest. A tracker is able to look at their footprints in the mud and judge how long ago they passed through. In this metaphor, our brains are both the wild animals and the tracker. With any neural activity, we can keep track of how long it took, and compare it to other intervals. Our sense of time is built up from this constant tracking and comparing. With this theory of timekeeping, the brain is constantly keeping time. That's its very function.

This theory shifts the focus from studying experience *of time* to experience *in time*. What can we glean from the rest of neuroscience concerning our experience *in time*?

There's increasing awareness that an understanding of consciousness and an understanding of time-consciousness are inseparable. Kent and Wittman (2021) for instance, stress that an understanding of time is crucial to a neurological theory of consciousness. They criticize major theories of consciousness like the global neuronal workspace theory (Baars, 2005) and integrated information theory (Tononi et al., 2016) for inadequately dealing with time consciousness. These theories look at consciousness at the scale of hundreds of milliseconds, while Kent and Wittman argue that consciousness is arranged in experienced moments that extend over the course of a few seconds.

This is a subject of fierce debate. Researchers like Pöppel (1989, 1997) argue that experienced moments last about 3 seconds. Of course, we have consciousness on shorter scales than this. But a mechanism of temporal integration binds successive events into 3 second perceptual units. Think of the Beatles song "Hey Jude." You don't just hear "hey" and "Jude" as separate units, but hear the phrase "hey Jude" as a perceptual whole (Lloyd 2012). Researchers like White (2017) disagree with regimented temporal integration. 3-second segmentation may be visible in some psychophysics experience, but this is not consistent, and many experiments show much larger or shorter groupings. White argues that there is no uniform grouping across modalities. For example, we may integrate visual information at different times as we integrate auditory information, again at different times from conceptual information. What's striking about this debate is that it so far has used sparse phenomenological data aside from armchair introspection (think the "Hey Jude" example). What happens when we bring actual subjective experience into the mix? Do we

really group experienced moments into 3-second intervals? I'll save a prolongued discussion of this for the Chapter 14 discussion (section: What is a moment?). But I will say that 3-second grouping, if it does exist, is certainly not as clear as researchers like Pöppel make it out to be.

But just because 3 second intergration intervals are controversial doesn't negate Kent and Wittman's (2021) point that a theory of consciousness must look at time consciousness. Temporality is such an intrinsic part of our subjective experience, that it would be counterintuitive to ignore it. Indeed, Northoff and Huang (2017) posit a theory of consciousness based on neural interactions in time and space, which they aptly call the Temporo-spatial Theory of Consciousness. They build off Buzsáki's (2007) work on different rhythms of the brain ranging from infraslow frequencies (0.01–0.1 Hz), to slow (0.1–1 Hz), to faster ones (1–240 Hz). According to Northoff and Huang, the brain has a fractal organization whereby shorter frequencies are nested within longer ones. This temporal nestedness accounts for consciousness. And other temporo-spatial features account for various features and properties of consciousness. So a theory of consciousness hinges on understanding time, and how our brain evolves over time.

Wolff et al. (2018) deal with similar turf as Northoff and Huang (2017), but more specifically with the construction of the self over various timescales. They also base this on the fractal, temporally nested organization of the brain. The authors compare third-person showing these nested patterns to first-person results, shifting from a neurological level of explanation to a psychological one. Here, sense of self must be preserved across various timescales—from extremely short ones, to longer and longer ones. Wolf et al. posit connections between neural temporal nestedness and psychological temporal nestedness. They find correlations between self-consciousness (as measured by a self-report questionnaire) and certain EEG measures that mark temporal nestedness, continuity, and integration.

Both of these theories from Northoff and Huang (2017) and Wofl et al. (2018) are quite exploratory and in of experimental support or replication. I'm also not sure if Wolf et al.'s methods are phenomenologically sound, since at times they conflate sense of self with self-consciousness. Inferring from my DES and dDES data, I think it's likely that you can have a sense of self—of agency and ownership for instance—without necessarily thinking about yourself or having heightened self-consciousness. Still, the direction presented by these studies is interesting. Our consciousness, like our neural activity, may be fractal in nature, built up of ever-larger patterns, that maintain our sense of self across milliseconds, seconds, minutes, and even years and decades.

On the subject of ever-expanding scales, eminent neuroscientist Karl Friston gives a tentative framework for the temporal scales of brain and mind. From the order of smallest to largest: Peripheral reflexes, Transcortical reflexes, Percepts, Concepts, Narratives, and

Self-awareness (Friston et al., 2018). It's an intriguing model of increasing scales. But phenomenological data complicates it. As one passes from the level of transcortical reflexes to percepts, we enter the realm of subjective experience. We switch from the third- to the first-person. And phenomenological data shows that conceptual experience is not always broader than perceptual experience (Hurlburt & Akhter, 2008). We'll see this later with experiences of 'sensory awareness' (a kind of perceptual experience) that can be quite prolonged and experiences of 'unsymbolized thinking' (a kind of conceptual experience) that can be very short.

As we've seen, neuroscience can push us in exciting new directions. But neuroscientists shouldn't assume that the phenomenological part of their research is easy. Most neuroscience doesn't just want to talk about electricity zapping through squishy grey matter—it wants to build up to talking about how all this zapping adds up to what we feel, what we perceive, who we are. But these connections are extraordinarily difficult and must be done carefully. For example, Hurlburt et al. (2016) used an fMRI study to demonstrate that spontaneous inner speech and task-elicited inner speech activated different parts of the brain. Different regions are activated depending on if we're engaging in inner monologue as we go about our day, or if we're engaging in inner monologue because some researcher in a white lab coat told us to.

So we cannot assume that tasks used in fMRI studies mirror what experience and resulting brain activity is like 'in the wild.' Any phenomenological assumption must be scrutinized. Neuroscientists play their own tennis game with rigorous rules, but when it comes to phenomenology, some think they can play without nets. This thesis is an attempt to put up some nets.[4] As we've seen throughout our review, the rigorous study of subjective experience is often missing. Concerning neuroscientific research, we don't know how zippy zaps in our grey matter add up to conscious experience. Concerning sociological research, we don't know how different vocabularies and ways of conceptualizing time play out in conscious experience. And concerning psychological findings, we don't know what's behind turning implicit time into explicit time. We don't know what duration estimates say about how time *was actually experienced*. And we don't even know what subjective reports of time experience say about how it *was actually experienced*. Any reporting may involve elements of retrospection and generalization. For these reasons, the study of consciousness needs to be fully integrated into the study of how we experience time from the levels of neuroscience to psychology to sociology.

Still, summing up the research, we've seen that from a psychological perspective time is many things. It's the flow of internal and external events, the patterns of our actions and

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[4] Metaphor cribbed from Daniel Dennett talking about non-philosophers doing philosophy (Kayzer et al. 1993). Also, I should note that this is in no way a dig at Friston or Wolff and colleagues whose research is intriguing and who are better than most with their ventures into phenomenology. It's simply a common feature of neuroscience research to take elements of first-person research for granted.

thoughts, the interaction of experience and memory, and the conceptual structures that govern our lives. Its rate of passage can alter depending on circumstance, mood, cognitive engagement, and other factors. Different personality types experience it differently. Altered perception of time can also factor into psychopathology. Different cultures can experience time differently—some as a regimented, measurable quantity, others as something looser, more tied to patterns of nature. And the mechanism for sorting and organizing this? Still not fully understood, but the best of our understanding reveals an array of time keepers—circadian rhythms, perceptual timekeepers, mechanisms linked with space and motion. And perhaps the brain itself as a timekeeper, any neural sequence extended over time and so marking time.

Temporal consciousness

So far we've stayed mainly with psychological and sociological research. Other questions emerge when we bring philosophy into the fray. One of the most perplexing questions (resting at the frontiers of neuroscience and phenomenology) is how we experience time at all. For instance, if we hear a melody ABCD, how do we perceive it as a melody and not just separate notes? How do we perceive duration, change, succession?

There are three broad perspectives to answering this question —those holding cinematic, retentionalist, or extensionalist views (Dainton, 2018). Other categorizations and overviews can be found in Dainton's books *Time and Space* (2010) and *Stream of Consciousness* (2000) but his 2018 grouping is a simple and useful one.

<u>Cinematic</u>
Those holding the cinematic view believe that experience comes in discrete moments without (significant) temporal extension. Think of experience like static frames in a film strip. Play it at a fast-enough pace and you can observe temporally extended phenomena.

Fig. 2
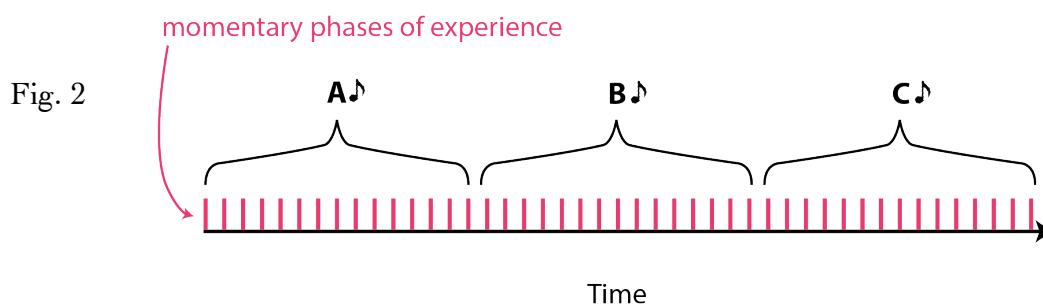
Retentionalists believe that episodes of consciousness lack significant temporal extension, but they have in their contents temporally extended phenomena. For example, think of the melody ABCD. When you're hearing D, you also have retentions of A, B, and C. It's through a scaffolding of these retentions that you can perceive duration, change, and succession.

Fig. 3

Extensionalist

Extensionalists believe that our episodes of experience are temporally extended. Persistence and change are incorporated in a direct way. For example, given the melody ABCD, you may have AB take up a chunk of your experience, and CD another chunk.

Fig. 4

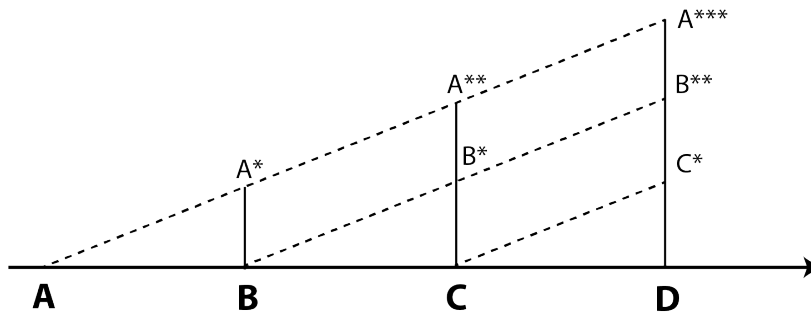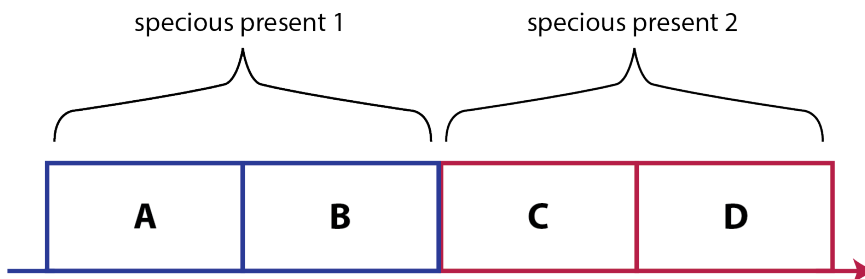This is just a cursory overview and we'll delve more into each category later. Categories, as always, are not so neat. For now, though, it's important to note the methods used to establish each of these views. Philosophers from Husserl (1928/1991) to James (1890/1983) to Varela (1999) to Dainton (2000, 2010, 2018) have relied on 'armchair introspection' to establish their views. They often do corroborate their views with third-person data. But when it comes to first-person data, they think it suffices to ask, 'what is my own temporal consciousness like?' 'When I hear the melody ABCD, what is it like?'

This kind of data is tempting. It's convenient. And it may *seem* like a good way of finding obvious features of experience. But armchair introspection is subject to certain distortions. Hurlburt defines it as "judgments about experience where the target, the occasion, the duration, the introspection, the interpretation, and the generalization are all self-defined, self-initiated, and performed by one person, generally on the basis of an implicit or

explicit theory" (Hurlburt & Schwitzgebel, 2011, p. 259).[5] Interpretation, generalizing, theory, etc. can all come between the observer and the phenomenon being observed. Dennett also excludes this kind of data from his list of acceptable first-person data—designating it as "lone-wolf autophenomenology, in which the subject and experimenter are one and the same person" (Dennett, 2003 p. 23). Even for obvious features of experience, 'armchair introspection' or 'lone-wolf autophenomenology' is not preferable. In fact, the more obvious the feature, the more these methods should be avoided, since the obvious is where our most entrenched presuppositions lie.

One example of such presuppositions is what Dainton calls the continuity thesis (Dainton, 2010, 2018). According to this theory, there are no gaps in consciousness. We always have some kind of experience, never any blank spots, any purgatorial spaces of absent experience. Dainton (2010) takes this as a given from phenomomenological data—from his armchair introspection. But our results, as we'll see, show a definite possibility of time in our waking lives when we have no conscious experience. Our methods don't have the power to prove the total absence of experience. But they cast enough doubt that the continuity thesis cannot be taken as a given and cannot be used as an a priori justification for any models of consciousness.

What's uphill?

So what happens when we bring in rigorous methods to the study of consciousness? Many of our results, which we'll unfurl throughout this thesis, are different from all previous findings, models, and speculations. They call for either adapting old models or creating new ones with the categories we'll present. Throughout the thesis, we'll build up to addressing this question of how temporal consciousness is composed at the most basic level.

First in Part I, we'll present some of the most established phenomenological methods and empirically compare two of them. We'll compare Descriptive Experience Sampling and micro-phenomenology using a mental imagery elicitation task. We find that different methods have different scopes, and different scopes lead to different result.[6] DES results more often focused on the visual space of mental images. Micro-phenomenology results focused on the broader experience of tasks. Even brought together with a standardized task, each method reveals markedly different aspects of experience.

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[5] I refer only to Hurlburt regarding this text with two authors because Hurlburt and Schwitzgebel trade off sections—arguing, critiquing, and occasionally agreeing with each other. This also occurs in Hurlburt & Schwitzgebel, 2011a and in Caracciolo & Hurlburt, 2006.

[6] Throughout this thesis, we'll talk about the *scope* of different methods as well as the *scale*. These similar terms have somewhat different meanings here. *Scale* applies more specifically to temporal frame—for instance, if we're investigating experience over the course of a few seconds or a few minutes. *Scope* applies to all other ways that methods can differ. For instance, whether we're investigating thoughts in direct experience or if methods maintain to investigate pre-reflective thoughts. Or if the focus is on a specific moment vs. if it's on the participant's interactions, sense of self, or life-world.

Then in Part II we'll introduce a new method to investigate temporal consciousness with as much precision as possible. We'll look at categories of temporal experience gleaned from 12 participants. We'll also delve into the temporal experience of 5 individuals. This is the real music of this thesis—experience in its most intricate nuances and gradations. If there's one takeaway, it's the variety of human experience. Each participant has *different temporal experience*. Of course, we know that our experience is different, but the differences presented here may be so stark as to make the reader question the method. Skepticism is important and an integral part of dDES. But bracketing presuppositions of experience is equally important. We must suspend what we think we know about inner experience.

Adrien had aspects that differed from all other participants: sudden shifts in experience that nonetheless felt reversible. He called these 'smooth jumps.' Experience could change from one moment to the next, while still seeming like previous experience could be returned to, unchanged.

Max had frequent elements of experience that overlapped from one moment to the next. Often these were elements of sensory awareness—noting sensory aspects of his environment, like the feeling of air on his toes or the taste of tomato sauce and mouthwash.

This is in contrast to Nora, whose experience most often switched completely from one moment to the next. There was often no gradual tapering in or out of experiential elements. Switches were sudden and complete. Nora also had elements that grew or diminished in awareness without growing or diminishing in intensity. For example, a feeling of annoyance could leave direct awareness without diminishing.

Matej had a number of unique features of experience, including highly localized inner speech and highly localized feeling. For example, inner speaking would be located in very specific regions, like a small pancake shape by the top of his head, or a thin band stretching across the front of his head. The shape and size of these regions could transform over time.

Ali had hypomanic periods where experience changed at a breathless pace. Multiple elements came one after the other, in a rapid trill.

We'll use this sampling to create new categories of temporal dynamics—Emerging, Disappearing, Overlapping, Transforming, Switching, Interrupting, Cross-fading, Focusing/Unfocusing, Buffer, and Rapid Fluctuating Awareness. But the idiographic features of participants are as essential as the broader categories generalized from their experience.

In Part III we'll situate the dDES method, evaluating it and connecting it to other disciplines. First this involves using dDES with a psychological task investigating free will, adapted from Libet et al.'s 1983 experiment. This will let us make connections to neuroscientific results. Varela coined the term "neurophenomenology" to designate a field where neuroscience and phenomenology inform each other through "mutual constraints," strengthening each other (1996, p. 344). Here, first and third person methods will provide

mutual constraints. We can relate observable properties to each other. We can 'triangulate' introspective, behavioral, and physiological evidence (Jack and Roepstorff, 2002).

Our findings call into question assumptions of the Libet task. We found experience relating to decision-making before the presumed time of decision. Temporal experience during the task was also different than temporal experience during everyday life for each individual. This raises questions of the ecological validity of the task. The Libet task is often used to argue against free will. Our findings raise doubts. The Libet experiment isn't quite the nail in the coffin of free will that some claim.

We'll also look into the limits of our method, in terms of how much it can say about agency, volition, and will.

Then we'll return to the question of how temporal consciousness is composed at the most fundamental level. We'll deal with the cinematic, extensionalist, and retentionalist models, as presented. Our data does not fit neatly with any. Previous models can be adapted to fit into our model of temporal categories presented in section II. Or our data can be used to form new models. Either way, new data presented here takes precedence over the armchair introspection used previously.

In the conclusion of this thesis, we'll turn to broader philosophical questions. In what way does our temporal consciousness relate to physical time in the universe? Can understanding temporal consciousness help us understand what time is? What are the next steps for investigating temporal consciousness?

I can't promise firm answers, only contributions to debates that have been churning for thousands of years. The conclusion gets a little weird. I'll stray from the previous hopefully rigorous presentation of the data to incorporate a range of views and paradigms.

I don't want you to get lost. There's a lot of embellishment and ornamentation in this thesis. But there are just a few main themes. To present them as simply as possible, here's a guiding haiku. Regarding temporal consciousness:

Each person unique
Different scale, different results
New models needed

Part I - Comparing Methods

2. Two Fields Diverge

This thesis's area of research lies in the intersection of phenomenology and experimental psychology. You would think that phenomenology—the study of subjective experience—and psychology—the study of the mind—would unite easily. But this union is not so straightforward. For decades since their inception, these domains have diverged. The relationship has its ebbs and flows, but you could chart it as two lines starting close together, arcing away, and once again verging back towards each other. Here I hope to do my part ushering a union, pushing for the reintegration of the study of consciousness in experimental psychology and the reintegration of experimental rigor in phenomenology.
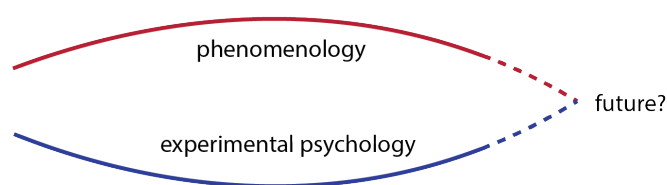
Fig. 5

Psychology

First, let's deal with the trajectory of psychology, and more specifically, psychology that deals with consciousness. For a long time, introspection has been taboo. It still is not integrated into mainstream experimental psychology. But this wasn't always the case. Introspection was deeply integrated into psychology at its origins. In the 19th century, Wundt and Fechner used introspection with stringent experimental conditions to advance work in psychophysics (Schultz & Schultz, 2011). Participants' (well trained) conscious experience was considered reliable data. Wundt described the discipline of psychology as one where "'the person looks upon himself as from within and tries to explain the interrelations of those processes that this internal observation discloses" (Diamond, 1980, p. 157).

A clash in the early 20th century managed to all but banish the role of introspection. This was a debate around the existence of imageless thought—whether or not all thought contained images, however faint (Hurlburt, 1993). 'Sensationalists' spearheaded by Titchener and other researchers at Cornell University thought there were always at least faint images or other forms of evocative content (Vermersch, 1999)

The Würzburg school—a collection of researchers based in the German city—disagreed. They thought it was possible to have thought with clear content but no images.[7] Although Hurlburt (1993) points out that the two competing schools did agree on the phenomenon in question, they just differed on interpretation. They both observed thought

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[7] Image in a broad sense that incorporates other sensory modalities. For example auditory images.

where images, if present at all, were extremely faint. They just had different explanations for this phenomenon.

After decades of dispute, when researchers couldn't resolve the question of imageless thought, introspection was essentially banished from psychology (Hurlburt, 1993; Petitmengin & Bitbol, 2013). Mentions to introspection in textbooks are rare, and when present are often disparaging. Take the conclusion to a short paragraph from Coon & Mitterer's *Introduction to Psychology* which simply states, "introspection proved to be a poor way to answer most questions" (2010, p. 22).

There's good reason to be skeptical of introspection. As Froese, Gould, and Seth point out, methodologies may be tainted by third-person impositions, interviewer beliefs, interviewee beliefs, and the analyst's interpretation (2011). At multiple steps in the process of obtaining first-person results, there's the possibility of distortion, exaggeration, and miscommunication.

Multiple studies have shown we can be mistaken about our own experience. This includes false memory studies where, for example, people are falsely led to believe they were lost in a shopping mall as a child (Loftus & Pickerel, 1995). Nisbett and Wilson's influential 1977 review of experiments incorporating subjective experience concludes that there may be "little or no direct introspective access to higher order cognitive processes" (p. 231). Subject reports are based not on actual experience but on implicit causal theories and judgments on experience they say. Irvine (2019) echoes this sentiment advocating 'dark pessimism' concerning the acceptance of introspective reports, arguing that there can probably be no advance of measurements to the point where we're able to compare individuals. For example, there's no way to compare the reports of two participants. There's no fixed metric to measure them against.

Schwitzgebel (2012) sums up, calling the act of introspection a "cognitive confluence of crazy spaghetti, with aspects of self-detection, self-shaping, self-fulfillment, spontaneous expression, priming and association, categorical assumptions, outward perception, memory, inference, hypothesis testing, bodily activity, and who only knows what else, all feeding into our judgments about current states of mind" (p. 41). In short, we don't know what actually goes through our minds. We'll address these concerns in the following chapter. Current methods and goals of experience research are different from those that brought down the introspectionists at the turn of the 20th century. We'll see that there are ways to incorporate inner experience into research. We'll serve some crazy spaghetti with our consciousness-time omelet. Although we'll try to find ways to limit the spaghetti and make it less crazy, more bland.

For now, let's note that experimental psychology does incorporate consciousness, it just pretends it doesn't. Psychologists assume that questionnaires and informal interviews are enough to provide insight into subjective experience. fMRI studies often presume a

phenomenological state during a task, for example presuming there is subjective feeling during a task related to emotion (e.g. Damasio & Carvalho, 2013, for a review of feelings and the brain). And they presume that a subjective state in the scanner is comparable to the same subjective state in everyday life. Shock or sadness in the scanner is supposed to be the same as 'in the wild.' Without the study of consciousness, we arrive at the wrong conclusions. Bernard Baars, a noted 'expert' on consciousness, writes, "human beings talk to themselves every moment of the waking day" (2003, p. 106). One look at the data subsequently presented here disproves this.

So armchair introspection like this needs to be avoided, and rigorous methods are needed. Experimental psychologists are slowly understanding that they cannot ignore conscious experience. There is renewed interest in first-person accounts (Cohen & Schooler, 1997). Methods are resurfacing. To Varela, we're living in a "consciousness boom," (2003, p. 115) even though a good deal of this 'boom' still privileges the third-person perspective over the first-person.

Methods like DES actually comply with Nisbett and Wilson's 1977 suggestions of how acceptable first-person reports might be obtained (Hurlburt & Heavey, 2006). These include suggestions of: 1) interrupting a process at the moment it was occurring, 2) alerting subjects to pay careful attention to their cognitive process, and 3) coaching them in introspective procedures.

Other methods exist that purport to examine experience in-depth. These could be dubbed methods of 'empirical phenomenology' (Kordeš, 2016), introspective methods, or first-person methods. However, some researchers argue that their method goes beyond the first-person, calling theirs a second-person approach—'you' (Varela & Shear, 1999; Petitmengin, 2006)—or a first-person-plural approach—'we' (Hurlburt & Schwitzgebel, 2007).

Besides DES, we'll examine two other methods in-depth in following chapters. The first is phenomenological psychopathology which incorporates clinical and philosophical axes (Stanghellini et al., 2019). The next is micro-phenomenology which seeks to put the participant in an evocation state to reenact experience (Petitmengin, 2006). We'll then present an empirical study comparing DES and micro-phenomenology using a common task.

There are other methods of empirical phenomenology to note as well. Some methods, like Giorgi's (2012) focus on specific moments. Van Manen's, in addition, seeks to avoid causal explanations, generalizations, or abstract interpretations (1990). Stern's micro-analytic interview uses a variety of questions to try to rev up the participant's imagination and capture experience as fully as possible (2004). Moustakas' human science research looks at how an experience affects the participant and significant others in their life (1994). Kvale uses open-ended questions to investigate the subject's 'life world' (1996).

Other methods are perhaps best not grouped under the category of empirical phenomenology but bear resemblance. Clean language interviewing aims to use content-empty,

non-leading language to examine experience (Nehyba & Lawley, 2020) Interviewers try to use only content and specialized vocabulary introduced by the interviewee. The think-aloud method has participants narrate their thoughts out loud and is widely used in areas like education and usability testing (Ericcson & Simon, 1980; Leighton, 2017; Boren & Ramey, 2000). For an example of what this method involves, imagine that you're trying out a new website and you speak aloud exactly what's going through your head as you click on a new section, get distracted by an ad, forget where you are, etc. Of course, narrating your thoughts can change them, so perhaps this method is best grouped separately from other methods of 'empirical phenomenology.' However, the methods presented here demonstrate the lines of phenomenology and psychology arcing back towards each other.

Phenomenology

Since its inception phenomenology also verged away from experimental psychology (although its relationship with clinical psychology is different). The term 'phenomenology' floated around in the 18th century and passed through Hegel and Kant (Smith, 2018). But it was Husserl who propelled it into defining a philosophical school (Williams, 2016). In its most general definition, 'phenomenology' designates the in-depth study of conscious experience. It's an investigation of phenomena—'that which shows itself.'

But phenomenology emphasizes not objects in themselves but our conscious experience of them; not the external world, but our internal states dealing with this world. By Husserl's program, it involves what's called the 'phenomenological reduction,' 'epoché,' or 'bracketing the natural attitude' (Husserl, 1952/1983, 1928/1991). This process was probably inspired by the mostly forgotten yet influential philosopher Shadworth Hodgson (Anderson & Grush, 2009). It involves ignoring or 'bracketing' everything that's not immediately present to consciousness.

To bracket presuppositions, one must leave aside any knowledge of causal relations between the world and consciousness. Don't take the 'thingness' of things and the world for granted. For example, if you see a kiwi, you would not say 'this is a real kiwi.' You would say 'the kiwi presents itself to me as a really existing kiwi.' The emphasis is on what's in your consciousness, not on what's in the world. The 'natural attitude' is that there is a kiwi out in the world, independent of your perception of it. This may very well be true, but phenomenology ignores it. This might seem an obscure philosophical point, but it's useful in research. For example, imagine a participant says, 'I had a mental image of a kiwi, probably because my mother was talking about kiwis earlier and how I should pick them up from the grocery store.' The next step is to determine whether the participant was really thinking about her mother and grocery shopping at this moment, or if it's merely a causal explanation to describe the mental image of a kiwi. Perhaps the kiwi was the only thing directly in consciousness at this moment.

Husserl was very much inspired by the psychology of his time (William James, for instance) (Anderson & Grush, 2009). Husserl mentions that phenomenology up until the time of his writing had been conceived as the 'substratum of empirical psychology' that deals with 'internal experience' (Husserl, 1952/1983 p. xviii). But he emphasized that in his vision, phenomenology was definitively separate from psychology. It was not the study of facts but the study of essences. (Husserl, 1952/1983 p. xx) Husserl also wasn't eager to propose methods of investigating consciousness (Williams, 2016). I'll take an opposite tack in this thesis. I won't pursue essences or pretend to know what they are. But I will be trying to improve methods for examining subjectivity.

So while phenomenology and psychology may have started quite close, to Husserl they were nonetheless fundamentally different. Phenomenology later became even more divorced from contemporaneous experimental psychology. Regarding other prominent figures in the field, Ricoeur went in the direction of hermeneutics, the interpretation of texts. Sartre in his earlier work engaged and often criticized classical psychology (1940/2004), but his later existential phenomenology was more tied to his philosophical theories of meaning than to any current psychological research. Heidegger, with works like *Being and Time* (1927/1985) went in the direction of ontology, the study of existence and being.[8]

An exception to the pattern of phenomenologists diverging from psychology is with Merleau-Ponty. He was very much inspired by psychological research, especially the Gestalt psychologists. I should also mention that Heidegger, Sartre, and Ricoeur were influenced by psychology, but more by psychoanalysis and other psychodynamic approaches (not always agreeing, and often reacting against) (Stanghellini et al., 2019). So even if confluence with *experimental* psychology was lacking, there was still confluence between phenomenology and *clinical* psychology, including psychodynamics.

For example, Sartre's existential philosophy was used for a form of existential psychoanalysis (Hatzimoysis, 2019). Heidegger corresponded with Binswanger who adapted Heidegger's ideas into a form of treatment called Daseinanalysis. This relationship between phenomenology and clinical practice was sometimes uneasy. For example, Heidegger thought that, in application, many of the concepts of *Being and Time* were lost. It went from being *ontological*—so about being, itself—to being *ontic*—so about specific instances of being (especially regarding the concept of 'care') (Fernandez, 2019). However, there has been more fruitful collaboration between phenomenology and the clinical side of psychology than the experimental side. The gap between clinical and experimental psychology surely contributed, and still does (Tavris, 2003). So even if phenomenology has

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[8] You may note the very Heideggerian title of this thesis. Indeed I'm fascinated by Heidegger's topic, although I'm using a very different set of methods to explore it. If you're patient enough to get to the last two chapters, we'll even dip our toes into the waters of ontology. We'll move beyond the specific ontic case of *consciousness* to explore the more general case of *being*.

had some relation with clinical psychology, for decades this has not bled into the research side.

An example is the lack of confluence between phenomenology and developments of the cognitive revolution in the 50s and 60s. Phenomenology largely ignored this new research. Likewise, cognitive scientists ignored phenomenology and the study of inner experience. This is strange because the study of consciousness would have benefited the cognitive revolution enormously. Cognitivists discussed supposed mental processes like computation, encoding, storage, retrieval, association, concepts, and other mentalisms without ever forming a concrete theory of how or if these were manifested in conscious experience (see Skinner, 1977, for an excoriation of these 'mentalisms'). Cognitive sciences thus have been strangely devoid of discussion of consciousness. There's much talk of processes happening in the mind, with little discussion of the subjective states involved in these processes. Sometimes subjective states are ignored and considered unimportant. At other times, they're assumed and considered trivial.

So to return to our broad strokes picture, we can draw the two domains as starting close, but then arcing even farther away from each other. But there is a return. New methods and research programs are popping up—neurophenomenology, DES, micro-phenomenology, and other methods of empirical phenomenology previously mentioned. Older methods and programs like phenomenological psychopathology are seeing a resurgence, especially in the past two decades (Fuchs et al., 2019). There exist now journals where theoretical and empirical research meet, for instance Consciousness and Cognition, Journal of Consciousness Studies, Constructivist Foundations, Phenomenology and the Cognitive Sciences, and Neuroscience of Consciousness.

In this thesis, I hope to fully join phenomenology and psychology. From psychology, this research draws experimental rigor. From phenomenology, it draws fascination with subjectivity. Might our two lines of psychology and phenomenology join and embrace? In pursuit of this we'll examine three methods in depth in the next section, 1) DES, which my method is based on, 2) phenomenological psychopathology, and 3) micro-phenomenology. Then we'll turn to a new method, dDES.

3. Descriptive Experience Sampling

The Method

Descriptive Experience Sampling (DES) is the main method we'll examine in this thesis. The new method I introduce is based off it. So our presentation of DES will be thorough.

The method was pioneered by Russell Hurlburt in the late 70s and refined over the course of subsequent decades (Hurlburt, 1979). It has so far been used mostly by Hurlburt and fellow researchers at the University of Nevada. DES aims to uncover moments of conscious experience, while limiting cognitive distortions that can come from reporting experience. It relies on randomly chosen moments that are often very short. DES involves careful interviews to reveal experience within these moments as faithfully as possible

Participants carry a beeper as they go about their daily life. This can be a specialized machine or a smartphone with programmed tones. The beeper delivers 700hz beeps—6 random beeps over the course of about 3 hours. After each of the beeps, participants jot down in a notebook the contents of their inner experience directly before the beep. So not experience at the time of the beep, or after the beep, but directly prior.

Participants jot down whatever was "before the footlights of consciousness" (James 1890/1983 as cited in Hurlburt & Heavey, 2006, p. 1). This could be a thought, feeling, action, sensation, tickle—but whatever was directly experienced at the time. The moment DES aims for is often extremely short, much shorter than participants are anticipating. It's sometimes referred to as the "last microsecond undisturbed by the beep itself" (Hurlburt & Heavey, 2002, p. 138). It's also referred to as a "mental snapshot" (Hurlburt & Heavey, 2006, p. 180).

The beeps serve to:

- randomly select moments to avoid participants selecting a 'favorite' that bolsters their presuppositions
- target specific concrete episodes
- keep target experience brief
- introspect with little delay
- disturb experience as little as possible

Within 24 hours of the 6 beeps being collected, participants are interviewed for one hour. The interview examines each of the sampled beeps individually. It aims to find out what exactly was in experience directly before each beep. The interviewers attempt to bracket any presuppositions to apprehend experience as it is. They also guide the participants to bracket any of their presuppositions—to get rid of pet theories and misconceptions of their experience. The interview involves "open beginninged questions" (Hurlburt and Heavey, 2006, p. 121). According to DES, there is "one legitimate question": "What, if

anything, was in your experience at the moment?" (Hurlburt, 2011a, p. 161) However, this 'one legitimate question' can be phrased in a variety of ways, and can guide other more specific questions about the participant's experience.

The interview process aims to:

   -separate actual experience from the participant's interpretation

   -rule out everything that is not directly experienced

   -disentangle actual experience from causal explanations

Any beeps not discussed within the hour-long interview are discarded. This whole process is repeated for multiple days—at least 4, but up to 10 or more. DES an iterative process. Training is needed, and each day of training aims to build up the participant's skill at describing his or her experience. The first day of sampling is always discarded since it's considered training.

Fig. 6

Beep through earpiece

apprehend moment before beep

jot down

1 hour interview within 24 hours

x6

x5+
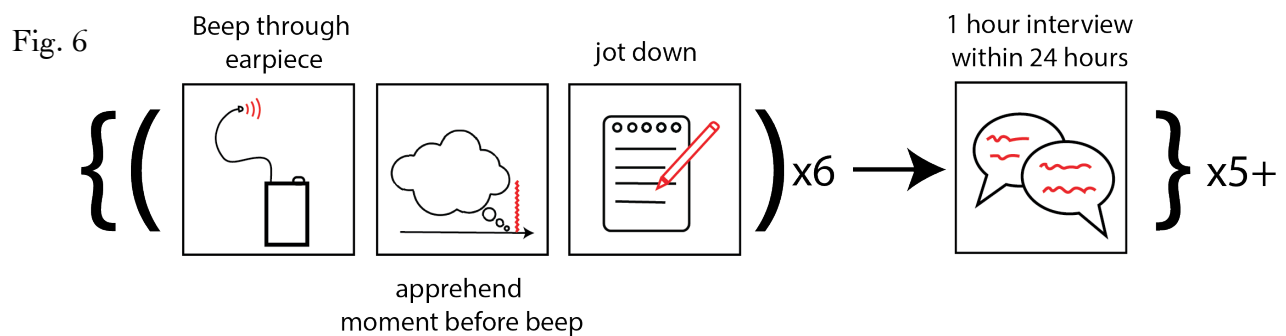
After samples are collected, a description is written of each sample. Samples are then coded. The example in the introduction was using my modified method involving two moments before the beep. From my data, here's a more standard DES example, with coding:

> **Sophie Sample 2.3**[9]
> Sophie was listening to a podcast and heard the words *"L'arche Perdu,"* French for the Indiana Jones movie, *Raiders of the Lost Ark*. She was trying to remember the movie but remembered a different one, *Indiana Jones and the Last Crusade*.
> At the moment of the beep, Sophie has a mental image of a cliff from *The Last Crusade*. There's a bridge going across. The cliff is reddish ocher. The image is large in her visual space. It doesn't take up the whole space, but there's nothing around it. It's more on the right side.
> There's also an "impression" of the void that goes with this image—the void of the deep cliff (probably an association from the movie).
> Coding: Image, Impression

The method is fundamentally idiographic, meaning referring to the characteristics of particular, unique individuals. As opposed to nomothetic referring to "general laws or universal characteristics of people" (Hurlburt & Heavey, 2006, p. 209). However, the introduction of coding marks the transition from the idiographic to the nomothetic. Codes can

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[9] The numbering for samples designates that this was the third sample of the second day.

designate categories that exist across multiple participants. For example, 'Image' is a common code used to denote mental images. The coding of 'Impression' is less frequent. It was useful several times for various participants. Perhaps a new category will emerge with more sampling. However, it's best not to force any comparisons. Some codes can be unique to participants or to samples.

After each sample is coded, inductive generalizations can be drawn for participants — for example, if someone has high degrees of inner speaking or high degrees of mental images. Since the method is idiographic, generalizations do not need to be made. However, when broader patterns occur, they are noted. From DES sampling, 5 frequent phenomena have been observed (Heavey & Hurlburt, 2008). These are: Images, Sensory Awareness, Inner Speaking, Unsymbolized Thinking, and Feeling. I'll explain these each in more detail later but for now a quick summary.

Image — A mental image. This is not about what the participant is actually looking at. For example, a participant could be driving a car, but they have a mental image of a kiwi. As we saw, Sophie had a mental image of a cliff.

Sensory Awareness — Paying attention to a specific aspect of sensation. For example, the sweet-sour taste of a kiwi. Or the fuzzy brown skin of a kiwi.

Inner Speaking—An inner monologue, a 'voice in your head.' For example, innerly saying, "I need to buy more kiwis."

Unsymbolized Thinking — A thought, often with clear content e.g. I need to buy more kiwis. But this thought is without images, words, or any other kind of symbol.

Feeling — An emotional experience. For example, feeling an intense hatred towards kiwis.

After inductive generalizations are made for participants, generalizations can also be made for groups. For example, there are DES studies of schizophrenia (Hurlburt, 1990), depression (Gunter, 2011; Lefforge, 2010; Scott, 2009), bipolar disorder (Kang, 2015), PTSD (Raymond 2011, Reger, 2014), Asperger syndrome (Hurlburt et al., 1994) and other conditions.

An example of group generalizations is with bulimia (Doucette, 1992; Hurlburt, 1993; Jones-Forrester, 2009). You might expect bulimic participants to have frequent thoughts about weight, food, and body image. In short, you'd expect findings to be about the *content* of experience. DES does indeed find increases in this content, but this is not the most salient finding. The most striking finding is regarding the *process* of experience, not *content*. DES found what could be termed 'fragmented multiplicity' of experience. In a high proportion of samples, bulimic individuals had up to dozens of different kinds of experience at the same time i.e. multiple thoughts, images, or verbal content. This phenomenon, frequent for those with bulimia, is otherwise extremely rare. Let's look at one sample description:

"**Jessica Sample 5.2**

Jessica was looking at her digital camera display, seeing a photo of her and her boyfriend taken on a recent trip to Chicago. While seeing this photo, she was also innerly seeing at least five separate, simultaneous, overlapping visual scenes of places she had visited in Chicago. These inner seeings were fuzzy or indistinct, and were apprehended as if looking at snapshots – the scenes had edges, for example.

Simultaneously, she was innerly seeing herself and her boyfriend standing close together at the kitchen sink. In this seeing, which was somewhat clearer than the Chicago scenes, Jessica was on the left, the boyfriend on the right, and both were seen from the back. This was a re-creation of an event that had actually taken place, but viewed from behind her, an obviously impossible perspective for her to have taken in reality.

Simultaneous she was feeling happy, apprehended as a volleyball-sized sensation deep in her stomach but also all over her stomach." (Hurlburt 2011a, p. 32)

So Jessica had at least five mental images of scenes in Chicago and another mental image of her and her boyfriend—all simultaneous in the short moment before the beep. This fragmented multiplicity holds for all bulimic participants. Findings like this go against established psychological findings. This illustrates why the bracketing of presuppositions is so important for the DES method.

<center>❋❋❋</center>

Now that we've seen a basic outline of the method, let's venture into its particularities, the kinds of questions asked, and the results found.

<u>The moment before the beep</u>

This is a tricky subject. It may strange for a thesis about time to be based off a method that examines a single moment. But even this moment has some temporal dimension.

Terminology can be problematic. The moment could be called 'the moment of the beep,' but this implies we're interested in experience during the beep, not before. It could be called the moment 'one millisecond before the beep,' but this implies a temporal precision that's unobtainable. It could be called 'the last undisturbed moment,' but that implies that we're not interested in moments caught in flight (Hurlburt & Heavey, 2006, p. 68). When describing the moment to participants, interviewers can alternate terms, to not rest too heavily on any one phrasing. DES simply looks at the shortest natural moment.

A brief moment minimizes required retrospection and reduces error. Hurlburt notes numerous constraints to the process throughout his book *Investigating Pristine Inner Experience* (2011a). These include that subjects initially:

-don't know what a moment is

-don't know what the moment of the beep is

-don't know what experience is

-don't know how to describe experience

-may be reluctant to describe experience

-don't distinguish between apprehension and theorizing

<center>38</center>

-don't bracket presuppositions

-don't observe skilfully

The one lacuna of this method is that it's hard to understand. I've found that no matter how I explain to participants or people interested in the research, until they undergo the procedure, they don't know what it entails, or what 'the moment of the beep' really means. It's like having your friend explain the rules of a new board game, and understanding nothing until you actually play the game yourself. So to overcome this problem, let's try to 'play the game' of DES. We'll create this immersion using two samples from a participant, Clara, an art history master's student living in Vienna. One is early in the process when Clara did not know what 'the moment of the beep' meant. The second is from later in the process when she had greater clarity. My comments concerning the interviews are italicized in brackets.

Clara Sample 1.2

Me: So what was in your experience right before beep two?

Clara: Uh I was doing some work for my dad, [*adapting a high-school history textbook for video*] so I was thinking about "what does 'wants' mean here?" "What does 'wants' mean here?" It was in a document, I think it was Virginia House of Burgesses, something from like the New England period. And I was embarrassed because I was like thinking to myself "I should know this." And then I also was thinking about how I was, I was distracted by the music, but the music was uplifting, but also distracts me. So it's sort of like if I was trying to concentrate, then why am I listening to music? Like it uplifts my mood and yeah [*already here I'm thinking that there are three aspects — "what does 'wants' mean," the embarrassment, and thinking about the music. Which of these, or all or none, are present?*] I guess what I was really thinking about right before the beep was "what does 'wants' mean in the specific context of this document?"

Me: So the word "wants" like w-a-n-t-s?

Clara: Yeah.

Me: So "what does 'wants' mean" was kind of the last thing before the beep?

Clara: Yeah. That's like very specific, right? [*Since on the previous beep I had pushed for greater specificity.*]

Me: Yeah. And I don't want to like give you false notions like we only want a really short section of time. Or like we only want one specific thing. Like maybe there were five different aspects at the same time, or maybe one, or maybe nothing. We don't know. [*Since she wanted to affirm it was specific enough, I was worried that she might get the wrong idea, for example, that by 'specific' we meant 'simple,' and just wanted one simple aspect. I tried to give options that her experience may very well have involved multiple different aspects, or possibly none. When giving non-content-neutral examples, the interviewer should include a range of options to limit any leading or biasing.*] But yeah that's something to go off of for now. So "what does 'wants' mean here" was the thought. Do you know how this thought was in experience or how it was experienced?

Clara: [pauses] Well I… read the sentence over and over again. [*Was reading in experience here?*] And I… I don't know, it was like experiencing intuition.

Me: Intuition.

Clara: Yeah because, you know, like language is so intuitive, you hear something so many times that you feel like it sounds right. But here it was strange because I was reading this document, from I don't know many many years ago, and as a result, I couldn't really grasp it. It was like, I don't know. It's hard, it's hard to describe something so abstract as thinking. [*Clara is being honest about the fact that this is hard, which is a very good sign. We still have to be wary about theorizing here, of which "you hear something so many times that you feel it sounds right" may be an example. Often when people switch to the second person, they are theorizing and not talking about their direct experience.*]

Me: Yeah. So if this was the thought exactly before the beep: "what does 'wants' mean here [*notice that I still say 'if' to allow the possibility that Clara's experience was of something else. It's good to always leave participants opportunities to revise their story*] do you remember were there words to that thought? Or no words? Or some other aspect? [*I'm trying to find out if Clara was innerly speaking or had some other kind of experience. Again, with non-content-neural questions it's always good to give multiple options to limit biasing.*]

Clara: I think I was thinking of replacements, and I was thinking about the word 'want.' The word 'want' in English is so easy, why am I questioning myself? [*This is a slightly different aspect than what was mentioned before. "What does 'wants' mean" is different from "why am I questioning myself?"*] But I thought about how the word was being used in this unusual way, like uncustomary. [*Another aspect.*] And I was also thinking about, I don't know, if I was a little tiny Spanish kid, Spanish-speaking kid, would I understand it? [*Another aspect.*] And I was trying to imagine what it would be like reading this if I wasn't myself but someone who maybe isn't as educated as me or as old as I am [*Another aspect. Also notice the use of subjunctifiers in Clara's speech throughout this sample. These are words or vocalizations that convey uncertainty or hesitation—e.g. like, ummm, maybe, I don't know.*]

Me: Yeah. So that's five different things. 'It's so easy, why am I questioning it?' 'It's used in an unusual way' is the second thing. 'What if I was a Spanish kid reading it' is another thing. And then there's 'what if there's someone less educated, or someone younger.' So those are five different things. [*Five if you count the last as two aspects, although they may be united.*] So what we're trying to find out is which of those is right before, closest, in the last moment before the beep. [*I'm visually representing this by demonstrating a timeline and emphasizing the moment right before the beep.*] Or maybe it's none of those, maybe it's something else. Or maybe it's all five of them at once. [*Again it's always good to give multiple options and not lead.*] Like I don't want to throw away any possibilities. But do you know? Would you be able to say?

Clara: No, I definitely wouldn't be able to say. [*It's great that Clara is being honest about the limitations of her knowledge. That shows that she's doing DES correctly and is being skeptical. The point of DES is not to get every detail from the first sample. The point is to train participants so that on the next sampling days they can be more specific and more accurate. It's an iterative method. At this point, I already know that we won't get too much more clarity out of this sample. So the goal of this interview now is to train Clara so she can be more skilled at sampling for following days.*] Umm I also don't know because I also wrote down, I feel like to me I can speak much better to my emotions than to my thoughts.

Me: Yeah. So emotions are easier for you. [*Repeating what she says but maintaining skepticism, since this may stem from presuppositions. Note that she generalized concerning her experience of emotions. She hasn't yet talked of a specific emotion at this moment.*] Did you have any emotions right, right before the beep?

Clara: Yeah. Embarrassment.

Me: So embarrassment.

Clara: Yeah, like why is this taking me so long.

Me: Yeah. And this embarrassment was at the same time as these other thought aspects?

Clara: I think so. Also a little bit of forgiveness, like maybe it's ok that I don't know. [*I am now wondering whether both of these were present, or maybe one, or maybe none. It's possible that embarrassment or forgiveness had been more general feelings during this time, but not present in awareness exactly at the beep. What comes next is my attempt to clarify.*]

Me: Uh huh. Um and, I think it's going to be hard to say on this sample cuz we're not used to the specificity, but maybe embarrassment comes here [*i gesture at our created timeline to some arbitrary point before the moment we're investigating*] but right before the beep you're not embarrassed. Or maybe it does come here. [*I gesture to the moment right before the beep*]. Or maybe after the beep you realize you were embarrassed, like I'll use a metaphor like driving a car. It's possible you could be driving a car skillfully, like you're doing that but you're having other thoughts that are directly in your experience. You're not directly experiencing driving a car, but you look back and say-

Clara: Daydreaming, you're talking about daydreaming

Me: Not necessarily. Just something, an ongoing process that may or may not be directly experienced. So just keep that as a possibility with any aspect we look at. So just the possibility that it may have been an ongoing process, but maybe not directly experienced. [*I'm aware here that I probably didn't make myself clear. The point was to give the possibility that something can be an ongoing process but not directly experienced. You can potentially be driving a car but not always have this in your direct experience. Likewise, it's possible that you can have an ongoing emotional process that isn't always directly in experience. Note that these are presuppositions. That's why I'm not insisting on them, just raising them as possibilities. See chapter 11 on Nora's experience for further discussion of what is and isn't directly experienced.*]

Clara: I think what happened was I saw this word, ok? And I thought to myself, I read it and I said, "that sounds funny." "That sounds off." You know, like if a fish smells? And then I reread it and I thought to myself "'Wants.' 'Wants' is an easy word. Why would I need to look this up?" You know? And then I was a bit embarrassed or ashamed. Ashamed of my English. And then I thought to myself like, "No, this is a good use of my time. What would a tiny little Spanish person-" -because it was a thought process I was going through with a lot of things, you know? With almost every single question. I'd been doing it for an hour before. So every single time it was the same kind of thing where- -And then I thought to myself like "well what would a German speaker have difficulty with?" And is that a useful thing- -is a German speaker the same as a young non-native English / Spanish / like bilingual kid? [*This is another previously unmentioned aspect about the German speaker.*]

Me: So 'is a German speaker the same as a young Spanish kid?' So it may have been this aspect right before the beep, like, if a German speaker is the same as a young Spanish kid?

Clara: That might be the last thought before the beep went off. [*This isn't enough certainty to continue probing this sample. We may have reached the end of its usefulness for training Clara's skills of apprehending experience. Memory can only go so far, and the point is not to lead the participant into fabrication. The point is to make them more aware in order to more accurately describe their experience on subsequent days.*]

Me: Ok. It's going to be hard to tell for now, but let's consider this all training for like the next days. The first day of this process is supposed to be training. Also part of this process is like, you're supposed to be skeptical of what the other person says. So I hope it's not, it doesn't come across like I don't trust you or trust your experience, I just-

Clara: -No I think, I think you're supposed to be skeptical because I'm skeptical of myself. [*It's a very good sign that Clara is saying this and that we can agree that mutual skepticism is useful.*]

Me: Yeah. This method's all about skepticism so-

Clara: -But not only that but, like, even the fact that we're reflecting on something that happened yesterday, and I can't even remember what I was thinking, it makes you just realize why history is about the archive, or history is about actions and not about thoughts. You know what I mean? Or documented verbalized words but not about thoughts. Because thinking is abstract.

Me: Yeah. And oral history is so hard to do because memory can change so much. And thoughts are so hard to get at. Even one day after.

Clara: Even this conversation is somehow shaping my perception of yesterday.

Me: Hm should we try beep three?

Clara: Sure.

In conclusion, Clara's skepticism is a very good sign. Her realizing that the conversation is shaping her perception of yesterday's sample is also a good sign. That can happen with questioning, especially if the moment itself wasn't recorded with great detail. If it does happen, it's best to move to the next sample.

The point of the first day of sampling is not to get all the details of each sample (and in fact we did not). The point is to train the participant so that on future days we don't need as much questioning that could potentially bias participants or lead to confabulation.

We never reached a faithful description of the moment right before the beep. It could be 1) the thought "what does 'wants' mean here?" either with or without words, 2) wondering why she's questioning it, 3) thinking 'wants' is used in an unusual way, 4) wondering what someone less educated would think, 5) wondering what someone younger would think, 6) wondering what a Spanish-speaking kid would think, 7) wondering if a German speaker and Spanish speaker would think in a similar way, 6) feeling embarrassment, 7) feeling forgiveness. The moment of the beep could have been none of these things. It could have been all seven of these things. It could have been any combination of some of them. The point is that we don't know. Clara doesn't yet have an understanding of what we mean by the moment of the beep. This will develop on subsequent training days.

What follows is an example from a later day to show DES running more smoothly, when Clara does understand 'the moment of the beep.' But even here there are still limitations to how much we can find out about Clara's experience. Clara's skill will continue to approve, and each day of DES sampling still serves as training for subsequent days.

Clara Sample 3.5

Clara: I was texting with Alvarro. That's the context. And I had a feeling that was scared.

Me: Mhmm.

Clara: I was scared because he was describing this infection in his eye and I was like *gasps*. I was just overwhelmed.

Me: So a scared, overwhelmed feeling.

Clara: Yeah. Just like *gasps*.

Me: Was there the content you just described about the eye infection or was there just the feeling? [*Trying to determine if she just had the feeling, or also had a thought component about her friend's eye infection, or possibly both combined.*]

Clara: No, I think I just like put the phone down, and it was a moment where I was just like "holy shit!" You know?

Me: Yeah. [*Although I'm actually still not quite sure the distinction was useful to her.*]

Clara: But there weren't any words it was just like... but also at the same time kindof a feeling of being angry.

Me: So scared, overwhelmed, "holy shit," but also angry?

Clara: Yeah.

Me: And these are the same feeling or two different feelings?

Clara: Two different feelings, experienced at the same time. [*She says this confidently and without hesitation.*] Because I knew this infection could have been avoided if he had just gone to the doctor, but since he doesn't have insurance, he didn't go to the doctor, and he didn't want to spend money, and I'm just angry with him for letting these things just like get so bad that they become...you know?

Me: Yeah. Was this content that you mentioned present? Like the fact that he didn't go the doctor, because of insurance—all of that. Or was it more the feeling?

Clara: At that moment, I just heard about this new news. And all I was feeling was this reaction to the news. Reaction to this knowledge that I had just gained.

Me: So yeah, now it's more the feeling than the specific content-

Clara: -Yeah definitely feeling. [*Even though she said "definitely," I don't think the distinction between feeling and content was so useful to her. She definitely had the feelings. And they were a reaction to this new content knowledge.*]

Me: So the fear, the overwhelmed... So you mention "overwhelmed." Does that apply to the fear or to the anger or to both of those?

Clara: I think to the scared part.

Me: Ok so this fear, overwhelmed, scared, "holy shit," part. And then the anger part.

Clara: Yeah.

Me: Does either of these feelings have a bodily location.

Clara: Maybe, maybe chest. I think my chest. I think I felt it in my chest. [*Note the subjunctifiers here: 'maybe' 'I think' 'I think'. Because of these, I will never be confident about the bodily location, even though Clara does become somewhat more confident.*]

Me: For the fear, or the anger, or both?

Clara: Umm the fear in my chest, and the anger in my forehead.

Me: Is that more metaphorical or literal, or between the two?

Clara: I think how I experienced it... I don't really know, because I think I would have to feel it.

Me: Is any of them more clear than the other? Like are you more certain of the chest one than the forehead one?

Clara: In this case, I'm more certain of the chest one than the forehead one. And I also feel like it might have something to do with a gesture that I make. Like I feel like I did something but I don't know what I did. Which then creates this feeling—you know what I mean? It's like my posture changes, you know? Or I tense up, you know?

Me: Yeah. [*I say this to confirm I understand. But we can't be entirely sure of these aspects. They're still heavily subjunctified. They're interesting, but we'll never be able to be confident of them. Hopefully on future sampling days Clara will be able to apprehend her experience with even greater detail, including concerning bodily locations to feelings if there are any.*]

Clara: I like, I felt tense, but I felt especially tense in like my chest and my forehead.

Me: So it's this tension feeling in the chest and the forehead.

Clara: Yeah. Which accompanies this sense of fear. I guess it makes the fear feel more real.

Me: Does it have a size? Or clear boundaries?

Clara: I think in this case it was quite mild. It was just like a moment like a *gasps*. You know? [*Seems like trying to get greater detail could lead to confabulation. This is a good place to end this sample.*]

Me: Yeah. Alright. Anything else for this moment?

Clara: No.

Afterward, a sample description is written.

> **Day 3 Sample 5**
> Clara was texting with her friend Alvarro, who was telling her about his eye infection. At the moment of the beep, Clara is experiencing two feelings. One is of anger. The other is a scared, overwhelmed feeling. It's unsure if these have bodily locations.
> <u>Coding</u>: Feeling x2

Here we have a greater understanding of the moment of the beep. It's not of the whole text conversation with Alvarro. It's of two specific feelings that were right before the beep. On subsequent days, we may gain even more specificity. For example, if other feelings have bodily locations, Clara may be able to ascertain these. Again, every day of interviewing is still training for the next day.

Understanding of 'the moment' is built up iteratively, day by day. Perhaps our very definition of a moment is built up iteratively. It is generally short, but this isn't obligatory. Moments can be long. It could be called the 'last uninterrupted moment,' but this doesn't describe it either, because DES can look at moments that were cut off. It is the shortest experiential moment that makes sense on its own. But this, in a way, is defined recursively. What does 'makes sense' mean? The moment is usually defined by the context, by experience itself, by experience with the method itself. For example, take inner speaking of "I

need to take the trash out." Most people would understand this whole sentence as one moment. Even though you could theoretically subdivide and count just the word "out" as a moment, this doesn't make sense as an experiential unit for most people. However, DES is ideographic and can be adapted to each person. To some, perhaps just the word "out" *could* count as one moment. We'll see examples of such experience in chapter 12 with Matej. Since DES is ideographic, there's very little we can say before the first interview to properly convey to someone what timescale we're looking at. But in that sense, the 'moment of the beep' may be arbitrary. Do we really segment time into moments? To be explored in following chapters.

<u>Bracketing</u>

Bracketing presuppositions must be done by both the researcher and the participant.

The researcher must suspend preconceptions of what the participant's inner experience is like. If the researcher encounters a new form of experience that is strange or seemingly 'unbelievable,' the researcher must bracket this view and investigate whether or not experience truly is as described.

Participants also need to suspend their implicit theories of what their experience is like. This is where DES training comes in. Many participants have preconceptions, like "I always think in words" or "I always think in pictures." It can take multiple days of training to get past these preconceptions.

Terms are not stable when describing experience. Participants can use a word like "thinking" in a variety of ways. It could mean Inner Speaking. It could mean Unsymbolized Thinking, thoughts without words or images. It could even have different meanings for the same participant. Our participant Nora used 'thinking' to mean feeling the sun shining hot on her hair. And to mean a mental image of someone putting on sunscreen in stripe patterns. And to mean unsymbolized thinking.

Training is essential. Take for example the case of John Michaels, who for one sample first started explaining that at the moment of the beep he was thinking about how much he liked turkey from the fast-food restaurant Farm Basket (Caracciolo & Hurlburt, 2016). After interviewing continued and his understanding of 'the moment of the beep' increased, John Michaels revealed that his actual inner experience was innerly seeing an ugly, green, slimy, gross-looking piece of breaded turkey boiling in grease. The original reported experience had nothing to do with the actual inner experience as it was later revealed. John Michaels's presuppositions about his experience got in the way.

And take the case of Donald (Hurlburt & Sipprelle, 1978). Before sampling started, Donald described his experience consisting mainly of anxiety. However, sampling revealed that his most frequent experience was anger at his children. Before sampling, Donald's

self-view consisted of a false generalization, about his anxiety. After sampling, he was able to create a real generalization: I do indeed have frequent anger towards my kids.

DES results can differ drastically from those of questionnaires that rely on participants' naive assumptions of their experience. For example, Heavey et al. (2019) found stark differences between questionnaire reports of frequency of Inner Speaking (68.3% of the time) and DES results for Inner Speaking frequency (26% of the time). People thought they had an inner monologue far more often than they actually did.

Another example of the importance of training is with the category Unsymbolized Thinking, which can be hard to recognize. Again, Unsymbolized Thinking is thought with no accompanying images, words, or any other kind of symbols. Unsymbolized Thinking is usually not fleeting or half-formed. Usually content is clear (Hurlburt & Akhter, 2008). Note that it's also possible that symbols exist but are just very faint. DES doesn't try to distinguish between the faint and the non-existent, avoiding the pitfalls that brought down the introspectionists at the turn of the 20th century.

Unsymbolized Thinking can be hard to recognize. Participants take multiple days before describing it in their samples. However, once recognized, it occurs with some frequency—in about 22% of samples (Heavey & Hurlburt, 2008). For example, on the third day of sampling (Sample 3.3), our participant Neža described experiencing a voice in her head. As the interview progressed, she revised her story and revealed that there probably was no voice and no words. You may be wondering whether the interview biased her to change her mind. This is always a danger of interviewing, but the questions asked are intended to avoid this. I simply asked questions aiming at greater specificity—if the voice was her own or someone else's, if there were words, what those words were. This can be enough to let participants question their implicit theories of experience. With this particular sample, I was never able to conclude it as Unsymbolized Thinking, but it served as training, and on following days, Neža was able to recognize Unsymbolized Thinking in her experience.

Another participant Anna, made her preconceptions against Unsymbolized Thinking clear. At one point. she argued that there's no such thing as thinking with clear content but no words or images, even though she'd exhibited Unsymbolized Thinking multiple times in previous samples. According to Anna: "Ok, do you have an idea of an elephant? The idea of an elephant is the picture, the image of an elephant. Even for a split second, or a drawn one, or an actual elephant, or a small one, or a big one, it's still an image. You can't just have an idea of an elephant." But DES research shows that you can indeed just have the idea of an elephant.

So training is important and bracketing of presuppositions is important, for the researcher as well as the participant. Hurlburt and Heavey write that learning how to conduct a DES interview is a skill akin to learning how to play violin (2006, p. 107). I should note the level of my own skill. Before the interviews conducted for subsequent chapters, I did conduct multiple practice interviews with participants. I had also read through most of the literature on DES. However, it should still be noted that I was a DES beginner at the start of this process.

Validity

DES takes an idiographic approach to judging validity (Hurlburt & Schwitzgebel, 2007). You look at the DES samples for subject A and ask: are they valid given the description of the method? You do the same for subjects B and C and so on until you can generalize and say that the method gives valid results. So validity is built up, just as DES sampling skill is built up. This kind of validity judgment can be informed by extra content cues—uncertainties, hesitations, glances. It can be informed by use of subjunctifiers—phrases such as 'like' 'maybe', 'umm,' 'sort of', 'I don't know but…' It can be informed by a subject's consistency across multiple interviews.

Of course, none of this is enough to confirm validity. So other comparisons are needed. Hurlburt and Heavey (2002) had different raters code DES descriptions and found high inter-observer reliability—comparable to the best questionnaires in use.

DES results should also be compared to other observables. Results should be situated in a "nomological net" to use a term from Cronbach & Meehl (1955, p. 290). This is the interlocking system of observables that in the case of DES can include first- and third-person data. Combined with this data, construct validity can be approached (Hurlburt & Heavey, 2006, p. 58). For example, take the case of Fran, who didn't have figure/ground distinction in her mental images (Hurlburt, 1993). To confirm whether this was really possible, Fran was shown visual tests, which determined that she had no figure/ground distinction. For example, with the face/vase figure illusion—which for most people alternates between depicting faces and a vase—Fran saw both the faces and the vase with no alternation. Hurlburt used an observable measure to test possibilities of Fran's private experience.

DES has also been combined with fMRI studies (Kühn et al., 2014; Hurlburt et al., 2015; Hurlburt et al., 2016; Fernyhough et al., 2018). Correlations exist between inner experience and neuroimaging results. For example, experience of inner speaking correlates to activity in language areas of the brain, around the perisylvian fissure (Hurlburt et al., 2016).

There have been criticisms of DES. For some it reduces too much, eschewing the richness of experience and the role of agency (Slaby, 2016). We'll investigate what first-person methods can say about agency in Part III of this thesis. For others, DES may not be rigor-

ous enough (Schwitzgebel, 2012). Consciousness can still play too many tricks to be accurately captured. Many researchers still shun introspection research as subjective. But Hurlburt writes of the radical non-subjectivity of DES (Hurlburt, 2011a). Of course, it is subjective in the sense of relating to the subject, and to the inner experience of the subject. But most uses of the term 'subjectivity' (e.g. impressionistic, vague, or relating to opinion) do not apply to DES. Depending on one's epistemological framework, DES may even aim for objectivity. The beep turns the experience being sampled into an object for investigation. You could argue that, unlike a physical object, moments of experience rely on interpretation. But Hurlburt argues that so do the objects we see around us. To see something like a newspaper as an object and not just a collection of individual sheets doesn't depend on intrinsic properties of the newspaper but on virtuous coordination of activity on the part of the subject. The same could be said of DES samples. Hurlburt doesn't fully commit to the argument that DES is objective but concludes that there "should be no glib confidence in the subjective/objective terminology as applied to inner experience" (Hurlburt, 2011a, p. 337).

Concerning epistemology, he prefers the terms 'faithful' and 'high fidelity' apprehension and not 'accurate' apprehension (Hurlburt, 2011b). DES can never aim for full accuracy, and depending on one's epistemological framework, perhaps there is no such thing. For example, according to perspectival realism, methods cannot give us objective truth—merely perspectives on it (Giere, 2006).

From a constructivist framework, there may be no relation between what methods reveal and any objective truth of the world. Methods construct their own 'truth' based on research goals and interaction between subject and researcher, between experience and interview (Kordeš and Demšar, 2019). Still even those arguing for a constructivist approach to phenomenology argue against 'arbitrary' construction. Even if our research goals do shape the data we obtain and analysis we conduct, we can still push for methods that better fit better the scientific project—of replicability, falsifiability, explanatory power, etc. As Froese, Gould, and Seth put it, we can ensure validity by seeing if methods "help us do better science or not" (2011, p. 39).

DES and Time

As mentioned, it might seem strange investigating temporal experience launching off a method that looks at just an instant. Hurlburt and Heavey write that they don't know if experience is a continuous flow or a succession of disjunct moments. Is it like a stream or like a "series of beads in a string" (2006, p. 71)? In short, they don't know how temporal experience is composed at its most basic level. This is a blind spot of the method and the reason why I'll propose an adaptation of DES for certain research goals.

However, it's wrong to claim, as some do, that there's no temporal component to DES. Sutton writes that DES encourages "temporal atomism" (Sutton, 2011, p. 121). Hurlburt responds that DES is not fully atomistic, but "referential" (2011b, p. 280). It refers to broader temporal patterns around the moment of the beep in order to situate this moment. For example, in one sample Melanie is innerly repeating the phrase 'nice long time'. This is a repetition from when Melanie first innerly spoke 'nice long time'. So we need to refer back to this original inner speaking of the phrase to understand Melanie's experience of the repetition. Hurlburt writes that "a description of Melanie's experience must refer to events outside the thin slice of the moment of the beep" (p. 282).

However, elsewhere Hurlburt and Heavey take subdivisions of experience as real (2015). The authors estimate the number of experiences in a day or year: "if an experience lasts, say, about 2 seconds, there are about 30,000 experiences per day or 11,000,000 per year" (p. 156). Does this make any sense? Dividing experience into neat moments may be a useful fiction that helps us obtain detailed results. But does it make any sense to reify these moments—for example, using them to estimate experiences per day or year? We'll return to this question with the exposition of our method, dDES. For now, let's examine what findings regarding time have emerged from standard DES.

<u>Idiographic time</u>

DES has shown that temporal experience can be quite different across individuals and across groups.

For example, take the case of bulimia. We mentioned before that bulimic individuals had 'fragmented multiplicity' of experience. Multiple—up to dozens of—elements could be in experience simultaneously. Another aspect that emerged across individuals was the distinction between direct experience and sensed awareness. Some samples involved aspects of experience that weren't directly conscious but were still sensed. Participants used different metaphors to describe this. Some compared these 'sensed' aspects to fish in an aquarium hiding under rocks. Only their tails are visible. (Doucette, 1992; Hulburt, 1993; Jones-Forrester, 2009). Another participant referred to 'strings' attached to thoughts and feelings. The thoughts and feelings were outside of awareness, but the strings were still visible (Hurlburt, 1993). So again, these elements weren't directly experienced but were still sensed (Doucette, 1992; Hulburt, 1993; Jones-Forrester, 2009). In one sample, a participant Susan was 'thinking' about what to buy her brother for his birthday—but this thinking was sensed, not directly experienced (Jones-Forrester, 2009, p. 207).

At an earlier or a later time, these could be directly conscious. Here, again, we see why DES is 'referential' and not 'atomistic.' To fully understand experience at the moment of the beep, we need to understand experience around this moment. We need to understand how the 'tails' or 'strings' do manifest in consciousness at an earlier or later time, in order to understand them when they're beyond the periphery of direct awareness.

Another example of an ideographic finding is with the professional guitarist Cobo. Cobo also was capable of having multiple experiential aspects simultaneously (Hurlburt, 2011a). For him, they wax and wane more or less independently, asynchronously, and gradually, so that at any moment some aspects of experience grow more salient while others diminish. For example, at one moment Cobo is working on a bio for Myspace site, in the middle of a thought of what he wants to enter, feeling confused about the process, feeling the pressure of his wife leaning on him, and probably talking to his wife as well (p. 263). These multiple elements of experience would increase and decrease in intensity, independently from each other. Furthermore, Hurlburt analyzes that for Cobo, unlike for other participants, there was no central locus of experience; no privileged perspective to coordinate all the elements in awareness. Instead, each element seemed to have its own perspective.

With DES, we can see the process of elements growing or fading in intensity. For example, in one sample Cobo is looking at a TV trying to make out what's displayed. "At the moment of the beep, his eyes are aimed at the TV screen but he has not yet actually perceived the TV itself or the picture on it; he sees grayness (which as a fact of the universe is reflected from the TV case, but Cobo has not yet seen the TV as an object)" (Hurlburt, 2011a, p. 267). Again, we can adopt a referential view to understand this experience. Cobo is in the process of perceiving the TV. If the beep had not been there, he probably would have perceived the TV. But in this moment, perception of TV is a growing aspect of experience. It is not even yet seen as an object.

With Cobo, we see temporal experience that perhaps differs from some preconceptions. As with most people, aspects of experience grow and diminish over time. But for Cobo, they can overlap while remaining independent. Cobo's overlapping experience and the fragmented multiplicity of bulimic participants show some of the dynamics that DES can uncover.

Repetition

DES can reveal other dynamics, such as repetition. In one sample, Amy is innerly speaking to herself "He's irritating me! He's irritating me!" (Hurlburt & Heavey, 2006, p. 24). In one of my own samples of Max (Sample 1.3), he is hearing the inner repetition of the word "enactivism" in his voice, slightly faster than normal speed.[10] In one sample, Sally, a schizophrenic participant, hears 20 or so simultaneous voices of what she calls 'the gods,' repeating the phrase "Dollie is a bitch... Dollie is a bitch" (Hurlburt, 1990, p. 246). The sentence is repeated ten times. The voices have a range of vocal characteristics, from bass to soprano, and are extremely clearly heard, as if they were surrounding her head on all sides.

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[10] I'm including some of my own samples here since I did conduct some standard DES sampling in addition to my altered dDES technique.

Images can also be repeated, as is the case with Fran, a participant with borderline personality disorder (Hurlburt, 1993). Fran experienced very distressing scenes repeating for hours and even days. For example, one scene was of her daughter saying that she wishes Fran succeeded when she tried killing herself the first time, and then throwing a hairbrush at her (p. 203). Of course, since DES looks at isolated moments, how do we know these images occurred for hours and days? This is inferred. The same images would often be present across multiple DES samples, hours or days apart. Combined with Fran's reporting of the images as ongoing, we can infer that they did indeed endure for longer periods. So DES can indeed examine longer patterns over time, instead of just isolated instances. We can see the time-course of *days* not just moments.

Mental Processes in time

DES can reveal certain mental process that take place over time. One example is with Violet who experiences images "come at her" literally. These images travel towards her from the front-right portion of her visual field (Hurlburt & Heavey, 2006, p 8).

Another example is with Sue, who in some samples sees fuzzy collages of experiences. For example, in one sample she sees a complex collage of experiences from her recent life. It's lacking in specific details of any one event, and in that sense, is more like an impression than a specific visual. But it does seem multi-dimensional and the events are interrelated. There's a sense of chronological movement forward in time. Here we do have an aspect of explicit time, not just implicit time. Sense of movement forward in time is conveyed as part of a complex visual impression.

For a third example, take Jason playing tennis (Hurlburt, 1990, p. 46). In one sample Jason is watching the ball come towards him. He has an image of a three-dimensional black line forming in an arc from where he's about to hit the ball to the place on his opponent's court where he's aiming. This animated black line is superimposed on Jason's view of the real world. Its speed is comparable to, but maybe a bit faster than, the speed the actual ball would travel after it was hit. The line formed itself and then disappeared. So we see a process over time—the forming and disappearing of a black line. This is a process that aids Jason's own physical movements over time. Here we can see how mental life and action intertwine as they unfold over time.

Samples hinting at a longer process

The moment of the beep, as we've seen, is short. But sometimes it can hint at a longer process.

For example, in one sample, 9-year-old Jimmy had a mental image of a hole he had been digging in his backyard for days. The interviewer asked, "Was this hole in your imaginary picture just like the real hole in your backyard?" Jimmy replied "Yes […] except that the real hole has more toys in it. If you had beeped me in a couple minutes, I would

have had time to finish the picture" (Hurlburt & Heavey, 2006, p viii). This sample shows that for Jimmy, mental images could be something constructed over time, not always appearing pre-formed. Perhaps for other younger participants, mental images can also be built up over time. Most adults think of mental images as entering fully formed (at least this was my preconception). But Hurlburt at one point writes, "I have sampled with a few children, and they sometimes take minutes to create images" (Hurlburt & Schwitzgebel, 2007, p. 111). Perhaps building mental images may be a skill that we get faster at, but originally takes more time. As we grow older, we may forget our earlier experiences of imagery formation.

Other processes may also be built up over time. For example, teenage Wendy had a mental scene she'd been repeating for days (Hurlburt & Schwitzgebel, 2007, 111). It was of her school orchestra performing one of their pieces, seen and heard from her position as a violinist. At each repetition, Wendy corrected a flaw in the performance, removing the squeak of a violin or the squawk of a clarinet. At each repetition, the orchestra sounded better. Here a scene with auditory and visual aspects is 'played' with and improved over time.

Experiencing feelings may also be a skill built up over time. Before one sample, 11-year-old AV had been watching a TV episode where one of her favorite characters had died (Hurlburt, 2011a, p. 126). AV had gone to lie down in her bed and was repeating to herself aloud "I'm sad, I'm sad, I'm sad." The moment of the beep was of the final "I'm sad." However, AV was not actually feeling sad at the moment. Perhaps the repetition of the words aimed to abet the feeling. And it's possible that emotional processes may have been ongoing without yet a feeling present in awareness. We can speculate here that for Wendy, feeling may be a skill built over time. And for other children this is a possibility as well.

More sampling is needed to build any definite theory of how certain skills—that most of us as adults take for granted—can be built up over time. But these samples hint at intriguing possibilities. DES moments can show us not just isolated snapshots, but also the inklings of certain processes and skills that could take years to develop. DES can be used to examine the time course of *years*, not just moments or days.

<u>Percieved time vs real time</u>

DES results can help us examine the relation between inner experience and the broader world.

Subjective time doesn't always line up with 'objective' time, the time of the real world. Sometimes inner experience can be in normal speed, even though it must have occurred much faster from an outside perspective. For example, in one sample Willis was innerly saying "What a jerk! I hope I never see that idiot again!" while simultaneously slamming

his book shut. The inner speaking took place entirely within the interval that he was slamming the book shut. But the inner speaking was perceived as taking place at normal speed. Hurlburt et al. (2013) conclude that this "is physically impossible but experientially natural."

We can compare this to a sample of mine where Clara was innerly speaking the word "soap." She described this as normal speed to her, but that others would have perceived it as fast, because others characterize her voice as fast.

In both of these examples, time becomes something different from a different frame. To the person experiencing, it's one thing. But say we tapped a machine—let's call it the Phenomotron3000—into these people's heads that analyzed their neural patterns and projected their inner speech to a loudspeaker. To others observing this projected inner speech, it would occur extremely rapidly.

Let's return to our characterization of 'objective' time. Perhaps there is no such thing, for the case of the 'speed' of inner speech, or of any mental event. Our scenarios always involve a second observer (or perhaps multiple observers). As in special relativity, time depends on the frame of reference of the observer.

With schizophrenia, the sequence of events experienced may be different from the sequence of events for others. For example, those without schizophrenia would experience a sequence as ABC. Those with schizophrenia may experience it as ACB (Hurlburt, 1990). Events may enter consciousness at a different time than when the brain first starts processing them. Again, I hesitate to say that those with schizophrenia don't experience the order of events as they occur in 'real time.' What is real time? Perhaps there is only the order that most people perceive these events. Mostly we perceive events in the direction of the universe moving towards increasing entropy, and use this to form a conception of a linear arrow of time. The order of events experienced by some schizophrenic individuals may not follow this linear arrow.

I don't want to give unfounded confidence to the theory that our own experience always follows this linear arrow. Schwitzgebel brings up the example of hearing the fourth chime of a clock tower when you haven't been paying attention (Hurlburt & Schwitzgebel, 2011a). According to him, we're able to mentally travel back in time to the first chime and count out four chimes. However, we know that the first chime doesn't really come after the fourth, even though it entered our direct awareness in that order. We're able to construct a model of the linear arrow in time from our understanding of our minds and sensations. To take another example, who hasn't as a child counted out the seconds between lightning

and thunder in giddy fear of how far away the storm is?[11] We learn to coordinate the thunder and lightning which reach our senses at different times and understand them as actually occurring at the same time.

This to say that our own experience doesn't always follow our notions of linear time. And the way our sensory organs first register the world doesn't follow always follow linear time. However, most people develop some model of linear time in order to understand the world. Some schizophrenic people may have different models of time, and those with other psychological conditions may have different models as well.

However, our inner experience may not always fit with the temporal models of others. Hurlburt writes, "Time is a pretty screwy thing in the sense that it's not at all uncommon for people to report things that seem to violate the laws of temporal sequence" (Hurlburt & Schwitzgebel, 2007, p. 212). Hurlburt is addressing Schwitzgebel's skepticism of Melanie's experience. At the moment of the beep, Melanie is picking flower petals out of the sink. She had previously innerly spoken "nice long time" and is at this moment innerly hearing repetitions of that phrase. Each repetition seems to occur 'microseconds' after the previous one. But the speech doesn't feel sped up. The whole sentence is instantaneous, while simultaneously extending in time. Schwitzgebel is skeptical that this is an accurate description of experience. How could something have temporal extension and still feel instantaneous? Hurlburt compares it to Mozart describing hearing an entire piece of music in an instant (not to necessarily trust Mozart's claim, only to illustrate).

It's possible for experience to violate our normal laws of temporal sequence, our normal understanding of the order of time. Mental time can be different from physical time. With the phenomenological reduction, we bracket any understanding of the relation between the mental world and the physical world. We bracket our presuppositions that since we understand the physical world to work a certain way, consciousness has to follow those same patterns.

While this bracketing is important for collecting data, in the conclusion we'll further explore the topic of how/if mental physical realms relate. For now, I find it interesting to point out that Melanie's experience may not even run counter to our understanding of physical laws. With a 'block universe' view of time, past, present, and future exist at once—simultaneity even though we experience it in sequence. Our presuppositions of the physical world may not hold for the physical world, much less for experience.

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[11] I must admit I'm using 'armchair introspection' here, as is Schwitzgebel. But I'm not advocating against its utility, just against outsized confidence and reliance on this method. So take this passage with a grain of salt, including the word 'model' as a mentalism for how we understand the world—something cognitive scientists use to explain mental processes, that may not have a neat counterpart in experience.

As we've seen with these multiple examples, despite temporality not being an explicit feature of DES, it still is incorporated.

We've seen that different individuals can have unique temporal experience. Bulimic individuals can have aspects of awareness that leave direct experience while still being sensed. Cobo the guitarist had multiple simultaneous independent aspects that waxed and waned.

We've seen that DES is referential not just atomistic. We can sometimes better understand the moment of the beep by understand what occurred before and afterwards.

We've seen that experience can involve various kinds of temporal dynamics. This includes repetition of words or images.

We've seen that DES can examine mental processes as they occur over time—moving lines on a tennis court, traveling mental images, collages conveying chronological movement forward.

We've seen that samples could let us infer about longer processes, for instance building the skill required to construct mental images, visual scenes, or feelings.

We've seen that samples can be compared and contrasted to our understanding of temporal sequence. This includes sequences of events—possible ACB sequences for those with schizophrenia. It includes our understanding of sequence and simultaneity—for example, Melanie's inner repetitions that were instantaneous yet didn't feel sped up.

So we can resoundingly conclude that DES still does include a temporal component. But in many ways, it's tacit. We reify 'the moment of the beep' in order to collect data. We saw that Hurlburt even speculated 11,000,000 experiences per year. What happens when we break apart what's meant by 'the moment of the beep'? What happens when we make the tacit temporal component of DES overt? We'll propose a new method for this in Part II. For now, let's turn to two other methods that make the temporal component of experience overt—first phenomenological psychopathology, and then micro-phenomenology.

4. Phenomenological Psychopathology

Phenomenological psychopathology has a much different scope from DES. It's not aimed at isolated moments, but rather at the individual's mental state over time—how it colors his/her interactions, sense of self, and life-world.[12]

The association between phenomenology and psychopathology (the study of mental disorders) was first postulated by Karl Jaspers, in his seminal work, *General Psychopathology* (1913/1946). The program has developed since then, especially with a rise in interest in the first two decades of the 21st century (Fuchs et al., 2019).

Phenomenological psychopathology fuses research and clinical applications. It integrates lived experience reports, knowledge from close contact with patients and treatments, hermeneutics, philosophy, and sociology (Stanghellini et al. 2019). In short, it relies on a grab-bag of approaches, which makes it hard to characterize any central method or technique. But the program's central pillar is in-depth questioning of individuals. Of course, questioning individuals is a part of any approach to psychopathology. But it's the attention to nuances of experiential shifts that characterizes phenomenological psychopathology. Through decades of engagement with theories not incorporated in mainstream psychology, phenomenological psychopathology has built up its own theoretical outlook, terminology, and assessment criteria.

Researchers 'give the word' to the patient. The aim is to uncover what his/her experience and lived world are like: lived time, lived space, lived body, intersubjectivity, and selfhood (Messas et al. 2018). Researchers explore the patient's abnormal experience from his/her own perspective. As with DES, bracketing of presuppositions is important. The goal is to reveal the patient's experience, without tainting it with the researcher's preconceptions.

We'll look at differences between findings from DES and phenomenological psychopathology. Then we'll talk about how differences in scope lead to different findings. We won't just investigate findings related to time, but also broader findings, which will let us discuss how temporal scales differ between DES and phenomenological psychopathology. Looking at psychopathology—that is, at alterations of so-called 'normal' experience—will also help us clarify what constitutes 'normal' experience and 'normal' temporal experience.

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[12] The life-world in phenomenological psychopathology is the world as experienced by the subject. It is the often unquestioned foundation for our thoughts and actions, and in turn, is built up through our thoughts and actions (Messeas et al. 2018).

Bulimia

DES, as we've seen, found that bulimic individuals experienced fragmented multiplicity (Doucette, 1992; Hurlburt, 1993; Jones-Forrester, 2009). Meaning multiple experiential elements at the same time—up to dozens of simultaneous thoughts, images, etc. We also saw that elements of awareness could be either directly experienced or sensed. Elements of sensed awareness were present, but only indirectly, like fish hiding behind rocks, where only tails are visible.

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Findings from phenomenological psychopathology are quite different. Researchers found preoccupation with body image. Bulimic individuals struggled to gain control over body and life (Castellini & Ricca, 2019). Another finding (for eating disorders in general) was detachment from oneself and one's emotions. Patients experienced alterations of identity and embodiment (Stanghellini et al. 2012). This included:
-feeling extraneous from one's body
-feeling oneself only through objective measures
-feeling oneself only through the gaze of the other
-feeling oneself through starvation

Those with eating disorders also had abnormal temporal experience (Castellini & Ricca, 2019). Time is understood in terms of control—controlling how much to eat and when; controlling the calorie content of food, and the timing of meals. Individuals experience anxiety for the passing of time (Stanghellini & Mancini, 2019). They also undergo 'ritualization/digitalization' of time. They create rituals to control the passing of time.

As we see, findings are quite different for DES and for phenomenological psychopathology. DES found mostly differences in *process* of experience rather than content. It did see some increase in thoughts related to body image, but its main finding regarded the *process* of experience—fragmented multiplicity. Phenomenological psychopathology found marked alterations in *content* in those with bulimia—preoccupations with body image, preoccupations with the gaze of others, feeling extraneous from one's body, etc.

It also found alterations in *content* related to time. In other words, it found influences of eating disorders on *explicit time*. Patients changed their approach to time, including creating rituals to control for its passing. DES found only differences in *implicit time*. Temporal experience in those with bulimia was different than for non-bulimic participants. Elements could fade from direct experience but still be sensed, and then could later return.

So differences in scope between DES and phenomenological psychopathology can shift our view from the implicit to explicit, and from process to content.

Schizophrenia

Regarding schizophrenia, phenomenological psychopathology finds shifts in temporal experience as well as anomalous experience of self. Anomalous self-experience is even present for early schizophrenia, before it becomes severe. Observing it can aid in early diagnosis. This has led to the creation of a scale—the Examination of Anomalous Self-experience (EASE) scale—which is capable of discriminating between schizophrenia, bipolar psychosis, and other psychoses (Haug et al., 2012). Anomalous self-experience includes:

-Alterations to sense of corporeality. This includes patients feeling their body as an object. Or feeling younger or older than their chronological age. Or experiencing that tasks which once were automatic—like brushing teeth—now require concentration.

-Alterations in relation to self. This includes subjects not feeling like themselves. Or feeling that they're "inhuman," that they're "becoming a monster" (Parnas & Handest, 2003, p. 125).

-Alterations in self demarcation. Sometimes patients can't distinguish between themselves and their speaking partner. Sometimes they can't tell where the self ends. One patient spoke of the "fluid transition between me and the world" that "must consist of a mixture of air molecules, sweat droplets and tiny fragments of skin debris" (p. 129).

-Alterations in existential orientation. This includes changes in the relation between the self and the world. According to one patient: "No, I could never kill myself. I can't imagine the world not being represented [by me]" (p. 130).

-Alterations of flow of consciousness. Sometimes the next thought arrives before the first is finished. Sometimes patients can't tell if they're thinking at all. It can feel as if their ideas are not generated by them. Or as if consciousness is emanating from multiple disconnected sources.

Schizophrenic patients can experience alterations in time perception (Fuchs, 2019). Inner time consciousness can disintegrate, leading to fragmented thoughts or movement (Stanghellini et al., 2016). There can be alterations in the 'intentional arc'—that thoughts and actions have a clear direction of past, present, future. Thoughts and movements can then be perceived as appearing 'out of the blue.' They can seem to not be coming from oneself, sometimes as if someone else is moving the patient's limbs (Fuchs, 2019). Schizophrenic patients can experience other abnormal temporal phenomena, like deja vu and premonitions (Stanghellini et al., 2016). In sum, phenomenological psychopathology found marked shifts in schizophrenic individuals' relation to time, to themselves, to others, and to the world.

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DES findings, again, are quite different. As we've seen, time can be switched up for schizophrenic participants. Events occurring in order ABC can be experienced in order

ACB. Might this be related to abnormal temporal experience like deja vu and premonitions? We can hold it as a possibility. For example, with ACB ordering, perhaps you can experience a glass having fallen off a table before it starts falling, reifying premonitions.

DES also found that participants had strong feelings, even if emotional expression was blunted. They also had frequent distorted mental images. These could be tilted, warped, marked with graffiti-like traces, or otherwise 'goofed up.' Images often had hard borders (like a photograph) instead of tapering off, as is more typical. Objects could float in air. In one sample, Sally saw what she calls 'the Gods' through a rectangular 'window' in the air (Hurlburt, 1990, p. 247). These twenty or so shadowy figures were milling around in a 3D space in mid-air.

Hurlburt (1990) concludes that schizophrenia may be more a disorder of perception than of association. He notes that some views hold schizophrenia to be a disorder of loose association. For example, sentences start on one topic and end on another. But this kind of loose association, that's clear in verbal reports, isn't present in inner experience. Here, instead, alterations in perception are the main tendency.

Participants also had distortions to their sense of self and locus of self. Some may have even had no organized locus of self altogether. Hurlburt (1990) goes as far as to suggest that some decompensating schizophrenics (when symptoms become severe) may even have no inner experience at all. Of course, it's impossible to conclude this definitively, and it's a speculation based on inference. When symptoms become severe, it's impossible to fully carry out the DES procedure.

So we've seen some possible confluence between DES and phenomenological psychopathology. Both observed interruptions to the flow of time. This includes ACB structure with DES and phenomena like premonitions with phenomenological psychopathology. Both methods also observed disturbance to the sense of self and locus of self.

However, again, the focus of each of the methods is different. DES observes mainly disturbances in perception. Phenomenological psychopathology focuses on anomalous experience as self. It's harder for DES to pursue this line of inquiry since as sense of self becomes increasingly disturbed, the DES task becomes impossible. Phenomenological psychopathology does, however, allow for retrospective descriptions and generalizations that are impossible with DES. And so it allows for findings of a broader temporal scope to emerge as well.

Depression

Regarding depression, phenomenological psychopathology again predominantly finds alterations related to content, while DES findings relate more to process, though are unclear.

Phenomenological psychopathology finds that individuals with depression experience guilt, shame, and despair (Henrikson & Skodlar, 2018). They also experience hopelessness, thoughts of death, estrangement from other people, loss of will, and the change of existential attitudes towards the world—the sense of the possibilities the world offers us (Ratcliffe, 2015).

In terms of time, depressed individuals experience the loss of drive, conation, and desire.[13] This results in a loss of basic momentum towards the future. Those with depression can remain passive before an impending threat. Time slows, drags, and stretches. The future is closed off—the only thing ahead is death (Ratcliffe, 2015; Fuchs, 2010). To quote one first-person account:

> "When I'm depressed, for the most part there is no time. The concept of time no longer exists. It's like living outside of time. There is no concern or even awareness of schedules, day or night, normality, commitments, birthdays, events—nothing. It's like being in a box with no holes or light—time just disappears." (Ratcliffe, 2015, p. 184)

The findings from phenomenological psychopathology recall other psychological findings we mentioned in the introduction—for instance, that time passes more slowly for depressed people (Thönes & Oberfeld, 2015; Hawkins et al., 1988). But as we saw, these are based on subjective reports. When estimating the objective passage of chronometric time there are no significant differences between depressed and non-depressed people.

So is implicit time not different for depressed people? Do differences only arise when implicit time is turned into explicit time, on certain occasions? According to phenomenological psychopathology, no. Implicit time is also different. Depressed people experience changes on the basic level of drives, desires, and conation. But is phenomenological psychopathology still confusing implicit and explicit time?[14] Let's look at DES findings.

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One DES study found that depressed people had much greater proportions of unsymbolized thinking than non-depressed people (Hurlburt, 1993). This, again, indicates changes in *process* of inner experience rather than the *content*. Depressed people had much higher frequencies of thought without images, words, or other symbols—thought that was often unclear and ill-defined. Interestingly, in this study, the content of depression wasn't so different than for non-depressed participants. Hurlburt didn't find the guilt, shame, and despair that phenomenological psychopathology found.

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[13] Which can be connected to protentions, using Husserl's framework, which we'll look into in Chapter 16.

[14] Ratcliffe (2015) also makes the distinction between implicit and explicit time and notes that depressed people have changes in both. However, it's possible that even though he makes this distinction, the method of phenomenological psychopathology still isn't able to fully untangle the difference.

Other DES studies did not replicate findings from this first study (which had a small sample size). One study found some instances of depressive symptomology (negative feelings, negative content, anxiety) but nothing statistically significant between groups (Gunter, 2011). So again, changes in *content* of thought between depressed and non-depressed individuals are not drastic. But this study did not replicate the finding of changes in *process*—of a surfeit of unsymbolized thinking.

Another study found that depressed people had more negative feelings during a task, but differences weren't so pronounced for their everyday life (Lefforge, 2010). Again, changes in content of experience were not drastic.

Another study looked at different response styles of depression—rumination vs. distraction (Scott, 2009). Those with a 'rumination' response style cope with negative content by repeatedly mulling it over. Those with a 'distraction' response style cope by distracting themselves with other thoughts. People with a 'rumination' response style had a higher frequency of unsymbolized thinking and feelings.

Still, it's interesting that few clear findings emerged from DES studies of depression. Could depression be a symptom cluster that's different for each individual? Could symptomology like despair, grief, etc. rely mainly on retrospective generalizations that aren't so present in momentary experience? Or could DES be incapable of uncovering broader trends?

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Other DES research exists relating to psychopathology, for instance, regarding Asperger syndrome (Hurlburt et al., 1994) and PTSD (Raymond, 2011; Reger, 2014)). Phenomenological psychopathology also covers a range of conditions. Findings for respective methods are always different. Each method has a different scope and investigates a different temporal scale. Especially with phenomenological psychopathology, we see that temporal experience can alter for different psychological conditions. Understanding these alterations can also help us better understand temporal experience for people without psychiatric diagnosis, as well.

From DES findings, we learn that 'normal' thought contains only one or a few elements at once, not dozens as with bulimia. When mental images are present, they're usually without photograph-like borders, and they're not tilted, warped, and marked up as with schizophrenia. Consciousness most often involves a unified locus of self.

From phenomenological psychopathology findings, we learn that 'normal' consciousness is integrated with the body and felt from an ego-centric perspective more than from the gaze of the other (although this can certainly be a factor). Normal consciousness involves an integrated unified sense of corporeality, sense of self, and perspective. It involves demarcations between the self and the outside world and a model of the relation between

self and world. It involves a flow of consciousness that's not radically disjunct (although disjunctions can occur, as we'll see). It involves drives, desires, and a sense of time's momentum towards the future.

One question lingers—why such drastic differences between methods? Let's look at some possibilities for why findings from DES and phenomenological psychopathology diverge to such a degree.

1) It's possible that phenomenological psychopathology captures experience faithfully, as it's lived, in temporal extension. DES only obtains fragments, devoid of larger meaning. Not only might DES miss important aspects, but these aspects *might not even exist* in isolated samples. They might only be observable with broader temporal extension.

So you could have broad patterns in your experience that wouldn't even show up in any moments of the specious present. Consider this option in terms of depression, where DES found no statistically significant differences in symptomology between depressed and non-depressed individuals (Gunter, 2011). Perhaps DES is incapable of picking up on broader trends that manifest on different temporal scales. Certain trends, like loss of desire and drive, may not even exist in isolated moments.

2) It's possible that DES captures direct experience. Phenomenological psychopathology on the other hand elicits a good deal of false generalizations.

For example, take reports of time passing slowly in depression. Maybe slow passage of time isn't directly experienced. Explicit time is confused with implicit time. It could be that depressed people look back at an activity and note the current time, observing that time is passing slowly. Observing 'time slowing' may then be a retrospective generalization.

Participants in phenomenological psychopathology research could also be led to expect certain experiences. They then go on to report these same experiences. Depression, for instance, could be subject to looping effects (Hacking, 1995). Established definitions of mental illness go on to affect how patients conceive of and experience that illness. So reports from phenomenological psychopathology could be generalizations based on biases or expectations. They might belong to what Hurlburt calls 'broad experience' instead of direct experience (Caracciolo & Hurlburt, 2016).

Hurlburt posits that broad experience and direct experience (or what he calls 'pristine experience) are fundamentally different. The direct experience that DES investigates is a phenomenon. It consists of observable facts or events.

Broad experience is not a phenomenon or a series of phenomena. It does not rely on observable facts or events (Caracciolo & Hurlburt, 2016). For example, think of someone talking about their 'experience of traveling through India' (section 79). This necessarily relies on generalizations, "post-hoc reflections, interpretation, judgments, presuppositions"

(section 46) and cognitive processes such as "availability heuristics, saliency, recency, and so on" (Hurlburt & Schwitzgebel, 2007, p. 127).

There's no such thing as an 'experience of India.' There is only the lived experience while there, in all its isolated components. And then when recounting this, it passes through the filters of selection and generalization. If you're describing your experience to a food lover friend, you might mention the curry you had. If you're describing it to a musician friend, you might describe a sitar concert. When you're thinking about it to yourself, you might conceptualize it as a grand success of new discoveries, or maybe as a disappointment and failure to get out of hot, crowded tourist traps.

But the point is that, to Hurlburt, this 'broad experience' is only an interpretation of the myriad incessant nows throughout your voyage, that you now are shuffling into some mosaic, abstracted from the original. DES aims at phenomena, whereas the experience of traveling through India is not a phenomenon. Hurlburt writes that the "potential discontinuity between pristine experience and broad-sense experience is more or less like the 'discontinuity' between the rim and the floor of the Grand Canyon of Arizona: it's not really a discontinuity (there are trails back and forth), but it's a pretty darn big distinction, and failing to recognize the distinction might be fatal" (Caracciolo & Hurlburt, 2016, section 93).

To Hurlburt, many of the phenomena we think of as real, are not. For example: hunger and thirst. We communicate as if these are stable concepts. If someone says, "I'm hungry," we know what they mean. But Hurlburt brings up samples to counter this. In one sample Dennis described being hungry. Further probing revealed that what he meant by this was that he had a mental image of himself with an exaggerated pained and hungry expression (section 175). An example of thirst: Tim had a metallic taste in his mouth (section 175). He understood that drinking tea would make the metallic taste go away. Are these what you imagine when you think of hunger and thirst? A mental image with an exaggerated expression, or a metallic taste? Probably not. And yet we assume that hunger and thirst are stable concepts that can be communicated. When someone uses these terms, we assume we have direct access to a phenomenon that they're describing. To Hurlburt, this access is illusory.

Hurlburt doesn't mention phenomenological psychopathology. But by his definition, the method would necessarily incorporate at least some elements of broad experience. We can compare asking about someone's 'experience of India' to asking about their 'experience of time' or 'experience of anxiety' or 'experience of depression.' This kind of question necessitates at least some generalizations, post-hoc reflections, interpretations, judgments, and indeed, presuppositions.

Of course, phenomenological psychopathology does try to base its generalizations on specific instances that participants recount. But could the selection, recounting, and interpretation of these specific instances themselves rely on the theory-laden presuppositions of both researchers and participants?

3) Another possibility is that both methods are faithful to experience. They just reveal different findings because they have different scopes. Results are still compatible. Experience just looks different whether examined over the time course of moments or a broader time course of an individual's interactions with others and with their life-world. To quote Emerson again, "Years teach much which the days never knew" (Emerson 1844/2000).

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So which of these views is correct? I suppose that it's a mix. Different methodological scopes do in fact reveal different things. However, we shouldn't be so pluralistic as to consider methods beyond critique. I think it's true that some claims of phenomenological psychopathology will later be falsified. The method undoubtedly involves some demand characteristics and elicits some theory-laden generalizations.

Some DES findings will undoubtedly be overturned—and some already have been, for example Hurlburt's (1993) generalization that depression was correlated with unsymbolized thinking. Good methods are flexible enough to adapt to subsequent developments.[15]

Finding differences and confluence between these two methods could be a good way to develop them. To start with, it's important to note that the different scope and temporal scale of each method does indeed lead to different results. For bulimia, we saw that DES revealed fragmented multiplicity whereas phenomenological psychopathology revealed preoccupation with body image. For schizophrenia, DES primarily revealed distortions of perception whereas phenomenological psychopathology primarily revealed anomalous self-experience. For depression, DES findings were unclear, whereas phenomenological psychopathology revealed clearer findings in symptomology and thoughts of negative content.

Respective methods also revealed differences in temporal experience. DES revealed possible ACB structure for schizophrenic people, and sensed thoughts passing in and out of direct awareness for bulimic individuals. Phenomenological psychopathology revealed disturbance of temporal flow for schizophrenics, digitalization of time for patients with eating disorders, and loss of drive towards the future for those with depression. Looking at different time courses of experience gives us different results for how temporal consciousness alters. This may seem trivial. Of course, the view on experience changes with a change in perspective. But to recall Hurlburt's example, we can be unaware of just how

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[15] Sutton (2011) thinks that DES could benefit from incorporating broad experience and acknowledging the complex relationship between past and present experience.

different these perspectives—like the difference of view from the rim or floor of the Grand Canyon.

Let's look at our next main method now, one of the most established phenomenological methods, and in its temporal scope lying somewhere between phenomenological psycho-pathology and DES.

5. Micro-phenomenology

Micro-phenomenology and DES are two of the most established methods of empirical phenomenology. However, there have been no comparisons of both methods with a single task, to see how the results might contradict or inform each other. In the next chapter, we'll offer a direct comparison of the two methods. We'll see that the main differences between DES and micro-phenomenology lie in how they treat time. For now, let's see what micro-phenomenology entails.

Micro-phenomenology is based on the elicitation interview developed by Pierre Vermersch during the 1990s (1999; 2009). Vermersch's method was used in settings like corporate psychology. Claire Petitmengin and coworkers then adapted the elicitation interview method and applied it to domains such as cognitive science (Petitmengin, 1999; 2006), and various clinical contexts (Le Van Quyen & Petitmengin, 2002; Katz, 2011). Micro-phenomenology is also often used to refine theory, for example constructivist or enactivist theory (Petitmengin & Bitbol, 2013; Petitmengin, 2017). The method is used by a growing group of researchers, mainly based in continental Europe.

Extended experience

Whereas DES looks at isolated moments, micro-phenomenology looks at temporally extended experience. This can be a very short span, of a few seconds. Or it can be a much longer span, lasting minutes. Micro-phenomenology practitioners believe that investigating temporal extension allows the true nature of experience to reveal itself.

Petitmengin has at times criticized DES's temporal rigidity. She responds to Hurlburt's call for DES participants to 'freeze' whatever was ongoing at the last undisturbed moment before the beep began—whatever was 'before the footlights of consciousness.' She writes,

> "It seems to me that the two metaphors included in this sentence are inadequate. To enter into contact with one's experience, it is necessary to respect its fluid and dynamic character, and therefore not 'to freeze' it. And entering into contact with it on the contrary enables its unfolding. By ignoring the dynamics of experience, the DES method narrows its field of investigation considerably." (Petitmengin, 2011, p. 59)

As we've seen, DES does still incorporate temporal extension. But micro-phenomenology makes this a much more explicit part of the method. It sets out to look at how consciousness unfolds over time.

How long is the interval investigated? This depends on the research goals of the project. Research involving micro-phenomenology often investigates specific processes e.g. the process of intuition in solving mathematical problems (Van-Quynh, 2017), or surprise during depression (Depraz et al., 2017). The span of the interval investigated depends on the

process at hand—for example, the length of a moment of mathematical insight or moment of surprise.

DES on the other hand looks at a participant's experiential field in their everyday life. It can also be adapted to examine experience during tasks e.g. the experience of reading (Brouwers et al., 2018) or of playing golf (Dickens et al., 2018). Still, it does not investigate a specific process during these tasks, and remains open to the possibility that experience can be markedly different from what we expect of a task.[16] So DES studies have not looked at surprise in depression but rather at the general experience of depressed individuals in their daily life (Gunter, 2011; Hurlburt, 1993; Lefforge, 2010). There haven't been DES studies specifically of mathematicians, but the typical study would involve looking at the inner experience of mathematicians in their daily life. It wouldn't set out to specifically examine moments of mathematical insight (unlike Van-Quynh, 2017). DES could also be used with a task, like having mathematicians solve challenging problems. But again, it wouldn't seek to investigate moments of mathematical insight—only experience during the

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[16] One example of this can be found in the collaboration between Caracciolo, a literary theorist, and Hurlburt. Their book *A Passion for Specificity* (2016) consists of (literally) one long email argument between them. Caracciolo was interested in the DES method and wanted to use it to see how readers experience narratives. Hurlburt warned: you can't use it to look at the 'experience of narratives.' You can only use it to look at how particular readers experience the activity of reading. There may be no such thing as the 'experience of narratives.' This may be a generalization regarding 'broad experience' rather than a consequence of 'direct experience.'

Indeed, after using DES to see how readers experience Kafka's *The Metamorphosis*, Caracciolo wanted to throw out the results. They couldn't possibly be accurate. One participant, Alex's, inner experience consisted only of a single word for every beep. Yet there was no experienced meaning to these words. Beep one: the word "swang." Beep two: "happy." Beep three: "way." No meaning. And nothing in his experience besides the words. Caracciolo thought Alex's experience couldn't possibly be like that, and if it was, Alex couldn't be reading with comprehension. But on a comprehension test, Alex was able to eloquently outline Gregor the cockroach's dynamics with his family and boss. Caracciolo's next instinct was to say that even if the DES samples were accurate, they're of no use to him, in his desire to understand the experience of narratives. The goals of literary theorists and DES researchers are simply different.

The argument between Hurlburt and Caracciolo over this takes up the rest of the book. But let me offer my take. Of course literary theory has different goals from DES, and in some ways, must incorporate generalizations—of how readers experience texts for instance. But it's in the interest of theorists for these to be accurate generalizations instead of false generalizations. Very little is really known about the direct experience of reading, about the phenomenology of reading. Generalizations may paper over how sparse our knowledge really is, like thin sheets of ice on a pond that might crack at any moment. Of course literary theory and other domains need to use generalizations. They need to talk about broader patterns of meaning and experience. But broader patterns of experience are composed of myriad instances of direct experience. In Alex's case, of moments reading individual words, without meaning—swang, happy, way. So little is known about this direct experience. It's the cold water under the pond of unknown depth.

Maybe literary theorists (and theorists of any domain) are too quick to impose their broader categories on the world, or on experience. In Caracciolo's case, he assumed every reader would have an 'experience of narrative.' When actual experience sampling countered his preconceptions, he first wanted to trash the samples. We can't assume that the broad concepts we use to communicate are actual present in direct experience, in the timescale of the specious present. What readers really have is a rush of incessant nows in response to a text. And how do these incessant nows add up to broader patterns? We still don't know.

This isn't to dismiss literary theory. Again, goals and methods necessarily are different from those of DES. But in all domains, not just literary theory, we should be open to necessity of adjusting the broader concepts we use to organize the world, as more phenomenological data comes in. Some of our broader concepts may be useful. Others might turn out to be too thin, like ice that cracks with the slightest pressure.

task. In fact, it would stay agnostic about whether or not there really is a clear category of experience that could be called a 'moment of insight.'

Retrospection and Re-enactment

Another main difference between methods is in the degree of retrospection involved. How far back is the experience investigated? DES looks at experience directly preceding the beep. Interviews are within 24 hours, to minimize retrospection. DES relies on iterative training so that participants become more skilled on subsequent days of sampling.

Micro-phenomenology is based on reenactment (Petitmengin, 2006). The interviewer guides the interviewee into a stable state of 'evocation'. The interviewee re-enacts the experience. For example, they might 'relive' the moment when they had an important mathematical insight.

There are two main types of micro-phenomenology—invoked and provoked. The invoked variety takes an experience from the more distant past. It can be days or even years before (Petitmengin, 1999). For example, Petitmengin looked at experiences of intuition for scientists, artists, and psychotherapists. These moments could be from any time in the participants' careers.

However, with provoked micro-phenomenology, the interview comes right after the experience. Take the example of surprise in depression (Depraz et al., 2017). This involved a task with a micro-phenomenological interview directly following.

Hurlburt and Akhter criticize (2006) micro-phenomenology, arguing that too much retrospection allows for distortion of the original experience. I agree with this criticism regarding much of the research using invoked micro-phenomenology. Studies like Nisbett and Wilson's 1977 review of first-person shows research show how fickle our access to our own experience is. If the targeted experience is days or even hours before the interview, there's danger of memory altering the recollected experience. If the experience in question is years before the interview, this danger is even more pronounced.

 Petitmengin (2011) maintains that DES also uses re-enactment. When you report on experience at the moment of the beep, you're reconstructing it. By this view, the difference between methods is more of degrees than of type. Provoked micro-phenomenology and DES might be quite close. But invoked micro-phenomenology, since it investigates experience significantly prior, may involve another degree of recreation and reenactment.

Still, even provoked micro-phenomenology can differ from DES in its scope. Lines of questioning progress differently depending on if you want the participant to return to and re-live experience, or if you simply want them to report essential elements of experience, using various aids, such as notes jotted down directly after the beep. Even with similar temporal scales, this distinction may lead to differences in results.

Interview Questions

Since micro-phenomenology aims to re-enact experience, interview questions differ from DES. They aim to guide the participant back to the experience in question and to 'stabilize' attention. Here are some examples quoted from a handout given at a micro-phenomenology workshop. They include questions to induce an evocation state:

"I suggest you go back in the situation."

"When was it?"

"Where was it?"

Questions are "non-inductive but directive." Interviewers don't try to bias interviewees with new content, but can try to turn their attention to certain aspects of experience. For example, interviewers can ask about different sensory experiences.

"When you are there, do you see anything?"

They can ask if the interviewee hears, feels, smells, or tastes anything. DES, on the other hand, doesn't ask about specific modalities. Even this may be enough to bias participants, according to DES. Perhaps there was no feeling, no taste, or smell at the moment of experience. Asking about any specific modality could lead participants to confabulate. Instead, DES asks non-inductive and also non-directive questions—for instance, if there was anything else in experience at the moment of the beep. Petitmengin criticizes this, arguing that "the beep does not indicate [the participant] towards which dimensions of his experience to direct his attention" (Petitmengin, 2006, p. 253). Hurlburt, however, sees this non-directive approach as crucial to the method. If participants don't at first know how to apprehend all aspects of their experience, the training should help them increase their skill on future days.

Other micro-phenomenology questions can, however, be quite similar to those of DES. Both methods try to extract as much detail as possible concerning experience. For example, concerning mental images, both methods press for further detail. Micro-phenomenology asks:

"Are you 'inside the scene' […] or do you see it as if it was a photograph or a film?"

DES asks similar questions, although would be careful not to limit to these two options.

Another difference is that micro-phenomenology can incorporate some "Eriksonian language." Questions include:

"And when you do nothing, what do you do?"

"And when you don't know, what do you know?"

"How do you know that you don't know?"

DES doesn't ask these questions.

Micro-phenomenology relies more heavily on nonverbal cues than DES—eye movements, gestures (Petitmengin, 2006). For example, Petitmengin writes, "a non-verbal indicator is the direction of the eyes: when the subject is reliving the past experience, he takes

his eyes off the interviewer to look 'into space', to the horizon" (p. 257). DES uses non-verbal cues as well but focuses more on subjunctification—filler words, pauses, etc. (Hurlburt & Heavey, 2006). And again, DES tries to avoid having the subject relive the experience. Differences in questions stem from this primary distinction.

Analysis

After the interview, micro-phenomenology researchers structure experience into a timeline. They break the experience down into phases and sub-phases. They also separate experience into its diachronic and synchronic dimensions (Horwitz et al., 2018).

The diachronic dimension refers to how experience unfolds over time. Horwitz et al. use the example, "first I see a black hole in front of my chest and then I see an image of a tunnel" (p. 15). These are successive events, taking place over time. First the black hole. Then the tunnel.

The synchronic dimension refers to moments in time where elements of experience occur simultaneously. For example: "In the hole there is an image where I am in the kitchen at the table in my childhood home and my mom is boiling the laundry on the stove and I smell the sheets" (p. 15). The hole, the image, and the smelling are simultaneous. So the synchronic dimension refers to elements taking place at the same time; the diachronic dimension refers to elements extending over time.

Once interviews have been analyzed, researchers can find commonalities within groups of people, or find general properties of human experience. They can refine theoretical points. Or, as with DES, they can highlight how consciousness differs for each individual, in its polychromatic array.

What vs. How

Another topic often mentioned comparing DES to micro-phenomenology regards the what vs. how of experience (Petitmengin, 2006). This is somewhat similar to our distinction between the 'content' and the 'process' of experience. The 'what' could be compared to the 'content'; the 'how' to the process.

With micro-phenomenology, once the interviewee's attention has been stabilized, and a state of evocation has been reached, it becomes possible to shift their focus of attention from the content of the experience to the process, by asking questions about how they experienced what they saw, heard, felt, and how they performed acts X, Y, Z. For example, Judee describes her experience of intuition: "When I'm going to enter into my intuitive mode, I'm going to place my consciousness much more towards the back of the skull. It's linked to the posture, I have to be very straight, and it's linked too, to the way I fit into my hips." (Petitmengin, 1999, p 61.) This aspect of intuitive thinking placed more towards the

back of the skull and connected to the Judee's body position concerns the 'how' of experience.

Petitmengin maintains that DES can't access this 'how' of experience. She argues that the DES beep most likely will not enable "the interviewee to direct his attention from 'what' to 'how', unless by chance" (Petitmengin, 2006, p. 253). So perhaps with DES, we would get only the content of an intuitive thought, and not the process—of it coming from the back of the skull and linked with posture. Petitmengin also argues that micro-phenomenology can uncover a greater level of detail. She argues that "The beeper is not suitable for observing very brief or very fine subjective events" (2006, p. 253).

However, Hurlburt doesn't share these views. At one point, he claims that he too is interested in the 'how' of experience (Hurlburt et al., 2002). And he does not concede that DES lags in level of detail it elicits.

These claims concerning the 'what' vs 'how' of experience and the level of detail revealed are related to the claim that micro-phenomenology can access pre-reflective thought and DES can only access reflective thought. Pre-reflective thought is meant to designate thoughts beyond what is immediately available in consciousness. Froese and colleagues (2011) for instance contrast this to DES, which they say adheres to a 'shallow conception of consciousness' and seeks only aspects that the subject is immediately aware of, and aspects that enter 'reflective self-awareness'.

DES remains agnostic about the reflective / pre-reflective debate and does not consider those categories useful to the method (Heavey et al., 2012) However, it is a misconception of DES that it only seeks 'self-awareness.' The goal of iterative training is to increase the subject's ability to faithfully report their experience and this often means reporting aspects that they were often previously unaware of. Hurlburt argues that some researchers define consciousness as what the subject is able to retrospectively apprehend. By those definitions, DES investigates what is often called 'unconscious' (Hurlburt & Schwitzgebel, 2007).

DES does impose some limits on what it can uncover, but those limits are governed solely by validity. Aspects that DES cannot confidently apprehend, it chooses to ignore. Hurlburt admits to the possibility of 'rich experience' that the sampling procedure might miss out on (Hurlburt & Schwitzgebel, 2007). Still, the goal of DES training is to increase skill at reporting experience and this often means increasing what the subject is able to report as conscious.

So for the debate not to become a muddy linguistic one, experiments such as ours in the following chapter are necessary. Are there results uncovered by one method but overlooked by the other? The question of pre-reflectiveness does still have some use. Are there aspects of experience that are outside of awareness that at the same time color awareness? Can micro-phenomenology reach some of this rich experience better? An answer to this

question lies best not with authors' claims of their method's depth, but with an analysis of results.

Validity

Concerning judging the validity of methods, there's much on which micro-phenomenology and DES practitioners agree.

Both methods rely on the interviews themselves. Have the guidelines of the respective methods been followed? Was questioning as non-inductive, content-neutral, and non-leading as possible? Do verbal and non-verbal cues indicate that the participant was faithfully describing experience? We saw that DES followed an ideographic approach to validity—was the experience of participant A faithfully apprehended? And so on with participant B, C, D, etc. Petitmengin also mentions checking the accuracy of the method "in the second person, in various contexts in research and training" (2006, p. 232).

Methods can also include the participant in judging accuracy. Micro-phenomenology often asks participants how they felt about the accuracy and completeness of their descriptions (Petitmengin & Bitbol, 2013). DES sometimes sends written samples back to participants and asks if the reports correspond to their experience or if anything should be changed.

Both methods also occasionally follow a "pragmatic validity criterion" (Petitmengin 2006, p. 256). Are participants helped by the process? Both DES and micro-phenomenology mention certain participants whose cognitive processes improved (Hurlburt, 1993). I'm unsure what to make of these claims, however (on both sides), since they're anecdotal and don't follow clinical standards. Neither DES nor micro-phenomenology have been integrated into therapeutic programs and submitted to randomized controlled trials for instance.

Both methods have also been combined with third person methods. As we've seen, this 'triangulation' of first and third-person methods can situate observations in a 'nomological net' helping us reach conclusions of validity. DES has been combined with fMRI studies (Kühn et al., 2014; Hurlburt et al., 2015; Hurlburt et al., 2016; Fernyhough et al., 2018). Micro-phenomenology has been combined with EEG (Le Van Quyen & Petitmengin, 2002; Petitmengin et al., 2006; Petitmengin et al., 2007) and has also been used with behavioral tasks involving the accuracy of reporting (e.g. Petitmengin et al. 2013). None of these studies offer direct proof of either method's validity. They do, however, offer inferences.

DES and micro-phenomenology practitioners disagree on one crucial point, however. Petitmengin proposes checking a participant's experience against the researcher's own experience. She calls this the "final validity criterion" and the "kingpin of all validation (Petitmengin, 2006, pp. 232, 255). Is the interviewee's experience similar to the researcher's?

Does it comply with the researcher's understanding of experience? Hurlburt and Akhter (2006) see this as harmful—a participant's experience may be radically different from the researcher's, and so should be 'bracketed' as much as possible.

Micro-phenomenology findings regarding time

Micro-phenomenology has revealed findings related to temporal consciousness, regarding both implicit time and explicit time. For an example of explicit time consciousness, one study investigated the experience of sequence-space synesthesia (Gould et al., 2014). Participants laid out time visually. For example, one participant organized the months of the years around a circle. Each month consisted of 10-day segments.

We can compare this to DES, which never looked at sequence space synesthesia, but which, through random sampling of everyday life, caught some mental images of time. There are several DES samples showing people manipulating mental images of calendars (Kang, 2015, p. 146; Raymond, 2011, p. 220). The devices we use to organize time may affect our inner experience.

Micro-phenomenology research has also investigated the experience of rhythm while listening to music (Petitmengin et al., 2009). This rhythmic experience is a good example of something that is potentially pre-reflective. One participant, Jean, recounts:

> "And then at the same moment, there is this profound rhythm, which is the pulsation, which is not written in the music. There is this extraordinarily profound pulsation, which is absolutely not intellectual, that is not in the notes. I feel profoundly the pulsation in my innermost being as something which rises and falls, which contracts, like a sort of big heart that beats" (p. 270).

Petitmengin and colleagues describe this pulsation as "infinitely more subtle than emotions" (p. 270). Perhaps apprehending it necessitates the same attention to subtlety that she claims DES is lacking—an emphasis on the 'how' of experience as well as the 'what.' We can wonder if DES would have uncovered this same aspect. Impossible to say. Although with some aspects of the description, DES would have pushed for clarification. Is this invocation of 'innermost being' literal, metaphorical, both, or neither? Is rising and falling literal? Is contracting literal? These would be lines of questioning with DES.

In her paper "Towards the Source of Thoughts," Petitmengin addresses the 'source dimension' of consciousness (2007). This is a deeper layer than the layer of obvious thoughts and sensations which float on the surface. It's a level where agency is diminished, where people refer to an idea 'coming' to them or an image 'appearing' to them. It's a level of embodied gesture—since abstract ideas (including time) are metaphorical transpositions of concrete gestures. Here, Petitmengin connects her research to that of Lakoff and Johnson and Marcel Jousse, where abstract ideas are built up from simpler concrete gestures, movement, and interaction with the world. So conception of time is built up through interaction in space.

Micro-phenomenology research has also dealt with alterations to sense of time while meditating (Ataria et al., 2015). An expert meditator was able to dissolve his sense of self and sense of boundaries between him and the world. While in this state, he also lacked a sense of time. The authors conclude that "any alteration in the sense of self is reflected in our sense of time" (p. 143). This is a study with a sample size of one so we must remain skeptical. Is there really *no* sense of time during meditation, or is it merely *altered* in some way? More studies would be needed. However, the link revealed between sense of self and sense of time is an interesting one. Perhaps indeed, changes in one necessarily entail changes in the other.

The authors compare this finding to another study involving prisoners of war (Ataria & Neria, 2013).[17] Here, in captivity as well, altered sense of self and sense of time went hand in hand. Prisoners felt time was passing in 'slow motion' or couldn't tell if 2 days or 10 had passed. Phases of the day blurred together. It wasn't clear to some when they were asleep or when they were tired or hallucinating. Several captives report there ceasing to be any time at all (p. 166, 167). Prisoners' relation to their body and self changed. For one, the body became not his own. It was a tool his captors could use to hurt him (p. 164). Sense of self and sense of time are not isolated processes but are connected and built up through the way we interact with the world around us. Other research argues along these lines. Wittman (2015), for instance, brings up a number of psychological and neurological studies linking sense of self and sense of time in both the mind and brain.

Micro-phenomenology can also be useful for looking at the time-course of certain processes, experiences, or states. One study used the method to find the peaks of altered experience under the influence of the psychedelic drug DMT (Timmermann et al., 2019). This was then paired with EEG data to find the neural correlates of the DMT experience. Researchers found the emergence of brain oscillations (within delta and theta frequency bands) correlating to the experiential peaks of the trip. So they used the broader temporal investigation that micro-phenomenology permits to find correlations with brain data. DMT also induced an altered sense of time in participants. So with this study, we have examples of explicit and implicit time. Implicit—the general time-course of the experience. Explicit—altered sense of time with DMT.[18]

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[17] Note that this study doesn't label its method as micro-phenomenology, but uses lengthy qualitative interviews inspired by micro-phenomenology.

[18] Benny Shannon has also conducted phenomenological research on the experience of ayahuasca (where DMT is the active chemical), including alterations in the experience of time (2001). Shannon doesn't use micro-phenomenology, but uses his own approach, combining experiential reports with ethnographic investigation. Shannon lived with tribes in the Amazon, conducted in-depth interviews, and even partook in many dozens of ayahuasca rituals to understand the experience. His research is a good example of what phenomenology can do.

Shannon finds that under the influence of DMT, time can move faster or slower, but usually faster. Some people observe huge spans of time—civilizations rising and falling. Past and future can be blurred.

The time-course of conditions, like seizures, can also be the subject of investigation (Le Van Quyen & Petitmengin, 2002; Petitmengin et al., 2006; Petitmengin et al., 2007). Researchers found awareness of 'prodromes' up to 24 hours before seizure (Petitmengin et al., 2007). These were physical or mental symptoms that could be used to predict upcoming seizures.[19] They included weakness, tiredness, and irritation. Petitmengin and colleagues posited correlations between prodromes and neural activity (phase scattering). This isn't a finding related to experience of explicit time, but it does show the time course of a disorder.

Findings regarding fibromyalgia do relate to explicit time (Valenzuela-Moguillansky, 2013). Participants experience altered sense of time. One participant, Y.G, recounted: "Six years have passed and I didn't see them go by, I think there's a period where there's a hole in fact." (p. 343) Another participant described hours and days when she doesn't exist: "my body exists, but I do nothing and I think of nothing" (p. 343). Fibromyalgia then — and perhaps other illnesses — changes time perception. These findings relate to explicit time, but perhaps implicit time is changed as well.[20]

Micro-phenomenology can also be used to find different categories of temporal experience. Depraz et al. (2017) studied surprise in depression. They showed participants a series of images, including an unpleasant and unexpected image of a buried baby, intended to generate surprise. They found general temporal patterns shared across individuals. These include (but are not limited to):

Mapping — inner activities appear while previous ones are still fully present

Overlapping — inner activities appear while previous ones are still present, and continue after the disappearance of the latter

Transformation — experience belonging to one category flows into a different experience belonging to another category

Ongoing processes — inner activities last throughout a phase, and can reappear even though they sometimes go unnoticed

Converging processes — two or more different kinds of inner activities merge into a single one

Diverging processes — experience splits into two or more inner activities (p. 198)

Participants can be unsure of 'when' they are. They can experience atemporality — being completely outside of time, unaffected by it.

[19] It's unclear from the research if these were prodromes that participants were previously unaware of. It's also unclear to what extent micro-phenomenology has therapeutic value for alleviating seizures. This is why methods should be integrated into structured clinical contexts and evaluated.

[20] Note also that these findings incorporate substantial generalizations, for example describing six years of life as leaving nothing but a hole. This resembles a general qualitative interview more than strict micro-phenomenology. How is implicit time during these six years felt?

DES doesn't observe any similar temporal categories. My method, dDES, does however, and later we'll compare my categories with the ones Depraz and colleagues found. There is some overlap, but also substantial differences.

❅❅❅

So to sum up, micro-phenomenological investigation found that, for some people, time can be arranged visually and spatially. For some, the time of rhythm can involve 'subtle' and 'profound' pulsations. For all, abstract ideas such as time are originally rooted in concrete embodied gestures. Temporality is not isolated from other factors. It's intrinsically wound up with sense of self and our sense of boundaries. Alteration in one can entail alteration in the other. This can be seen with meditation, with experiences of captivity, and with use of psychedelic substances. Sense of time can be altered as our relation to our bodies changes, as is the case with people with fibromyalgia. Micro-phenomenology can also be used to examine the time course of different conditions (seizure, for instance), or processes and states (altered states under the influence of DMT for instance). Finally, we saw that micro-phenomenology can be used to form a taxonomy of temporal experiences—revealing categories like mapping, overlapping, transformation etc.

Micro-phenomenology involves a different temporal scale and overall scope than DES. There are some similarities between findings—for instance, both methods have observed the presence of inner images, inner speech, feelings, sensations, and unsymbolized thinking.[21] But differences can be quite profound as well. These differences can be so large that it's paradoxically difficult to point them out. DES and micro-phenomenology simply have very different research goals and are difficult to compare. For example, few commonalities can be drawn between micro-phenomenology's study of surprise in depression (Depraz et al., 2017) and DES studies of depression (Gunter, 2011; Hurlburt, 1993; Lefforge, 2010). Micro-phenomenology doesn't seek to code and analyze of types of experience as DES does. DES findings for an individual, for example, may reveal high amounts of unsymbolized thinking and images, and low amounts of inner speech. Micro-phenomenology would offer no similar findings for comparison.

Often micro-phenomenological findings are presented in conjunction with a theoretical outlook—for example regarding embodied or enactive condition. DES practitioners are resistant to incorporating findings with existing theoretical frameworks. Hurlburt, for instance, notes that DES reveals substantial differences between individuals regarding amounts of sensory awareness, and that embodied cognition approaches have papered over this variability with generalizations about experience (Caracciolo & Hurlburt, sec-

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[21] Unsymbolized thinking isn't as common a finding in micro-phenomenology as in DES. But it has been observed. See Petitmengin et al., 2009, p. 261 for an example.

tions 239-240). To Hurlburt and Akhter (2006), theorizing can unduly influence inter-viewers and so a division of labor between interviewers and theoreticians is perhaps opti-mal.

So while findings can be quite different, it's hard to make direct comparisons between DES and micro-phenomenology from the research at hand. How do both methods stack up with a common task? How does the scope and scale of the method inform the findings? An empirical study next.

6. A Comparison

What follows is the first study bringing DES and micro-phenomenology together with a common task. It's difficult to find a task that's identical for both methods. Still, we brought them as close together as possible. This study was conducted in partnership with Elisa Wiedemann, who was instrumental in formulating the research design, conducting the micro-phenomenology interviews, analyzing the data, and drafting the original report.

There has been some contention between practitioners of these DES and micro-phenomenology in the past. Petitmengin (2006) argued that the DES beeper is "not suitable for observing very brief or very fine subjective events" (p. 253). Hurlburt and Akhter (2006) questioned the validity of micro-phenomenology.

There have been calls for peace. Vermersch argued that there's 'no competition' between the two methods. The only question is: how "apposite are they to their object of study"? (2011, p. 79)[22] This is a pluralistic approach. Each method has a different scope and investigates different phenomena.

Still, a comparison is useful to see what exactly are these different phenomena at hand. What are the 'objects of study' that each method investigates? Can the results of these two methods, as well as their respective validity or reliability, be compared?

With no objective measure, we cannot give a direct answer regarding validity of methods. But we can show the contours of these methods, in terms of what experiential aspects they uncover or potentially co-create. As we'll see, even given a common task, each method reveals different results. We found that micro-phenomenology tended to reveal broader experience of the task, and DES gave greater detail on the visual space of mental images. This study doesn't explicitly look at experience of time. We're using a visual task. But by comparing both methods, we're able to see their temporal scope and how they deal with temporal experience. Micro-phenomenology looks at longer stretches of time—here, about 10 seconds. DES looks at single 'moments'—of unspecified length, but probably around 2 seconds. You might think that this difference is trivial. But even with these relatively similar scales, consciousness can look quite different.

Research Design

More detail about the research design is given in Appendix IIA. But in sum, we wanted to use each method to investigate experience during a mental imagery task. This lets us examine how experience unfolds over time. The focus is on implicit time, rather than explicit time. We used a number of sentences involving visual descriptions. For example:

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[22] In fact, a study by Oblak (2020) incorporated aspects of each method to establish a new method.

—A child holds an ice cream cone with three scoops. The ice cream falls onto the hot pavement.

—A candle flickers in a dark room. A person sits down in front of it.

—Three children skate on a frozen pond. Birds chirp in the trees.

After each prompt, participants were given ten seconds to imagine what was described.

Four participants took part in this study. All were female cognitive science students at the University of Ljubljana, between the ages of 23 and 26. Names and occasionally identifying details have been changed in this study and throughout the thesis.

This small study could be considered a pilot study for future research. Still, we should take a moment for a note on sample sizes. Both DES and micro-phenomenology studies typically involve small sample sizes e.g. on the lower end, 1 for micro-phenomenology (Ataria et al., 2015) or 3 for DES (Hurlburt et al., 1994). The procedures are time-consuming. Both methods prioritize comparably small amounts of carefully acquired data, to large quantities of hastily acquired data, possibly distorted by presuppositions, demand characteristics, etc. Small sample sizes don't allow for overarching generalizations to be made. Here we're merely illustrating possibilities.

Large sample sizes come with positives and negatives. Positives are that large samples reduce the risk of outliers, can be more representative of the population, and create more accurate mean values for quantitative measures. They give greater chance of finding statistically significant results. For qualitative research, large sample sizes increase the likelihood of saturation—where new data offers no new useful information or themes. However large sample sizes for their own sake do little good. If the data obtained are not accurate, then having large amounts won't solve much. DES and micro-phenomenology thus try to rely on comparatively small amounts of carefully obtained data. If differences between groups are clear (such as with DES studies of bulimia, see Hurlburt, 1993), then large sample sizes aren't needed. Data saturation can be achieved even with small sample sizes.

Our participants were divided into two groups of two. One group first underwent the task combined with DES interviewing. They then underwent the task combined with micro-phenomenology interviewing. For the other group, the order was switched. First the task with micro-phenomenology, and then with DES. This was done in case experience with one method biased the participants and changed experience with the other method.

The DES portion involved 3 days of DES training, with random beeps as participants went about their daily life. There were 6 beeps a day and an expositional interview within 24 hours of the last beep. This was to build up sampling skill. This 3-day training was followed by the task. 32 prompts were played with 5 beeps interspersed at semi-random intervals. Participants had 10 seconds after each prompt to imagine what was described. An interview was conducted after each beep. Interviews followed the process outlined in Chapter 3.

For the micro-phenomenology portion, participants were first given a warm-up exercise. They were told to spell the word octopus. After, they were briefly interviewed on their experience of this. This is sometimes used to familiarize participants with the method (Heimann and Roepstorff, 2018). Then the main task. Participants listened to the prompts, followed by the 10 seconds to imagine what was described. This was followed by an elicitation interview. This process was conducted with 2 different prompts per participant. Participants never heard the same prompt twice in the DES and micro-phenomenology portion of the study. The elicitation interview followed the process outlined in Chapter 5. Interviews lasted up to one and a half hours.
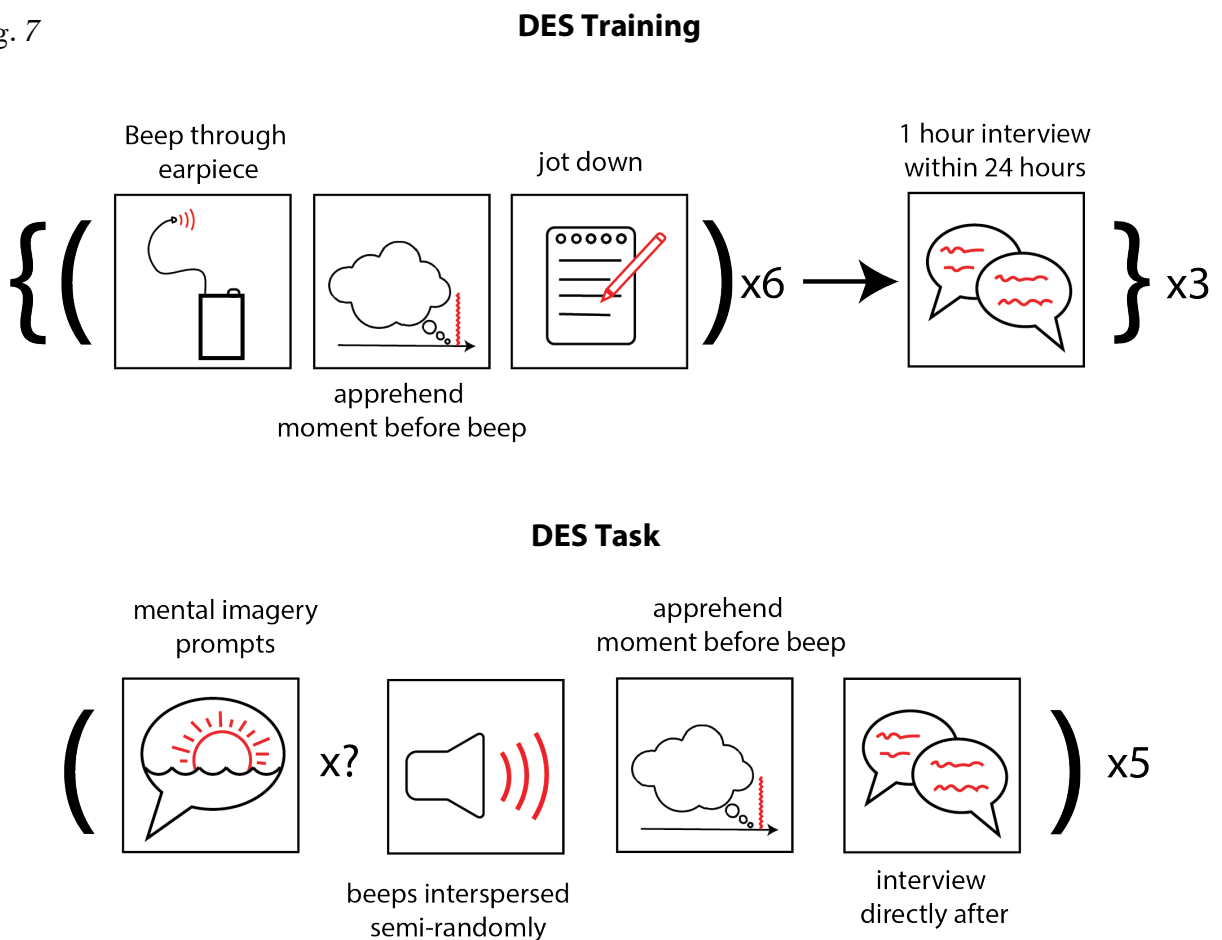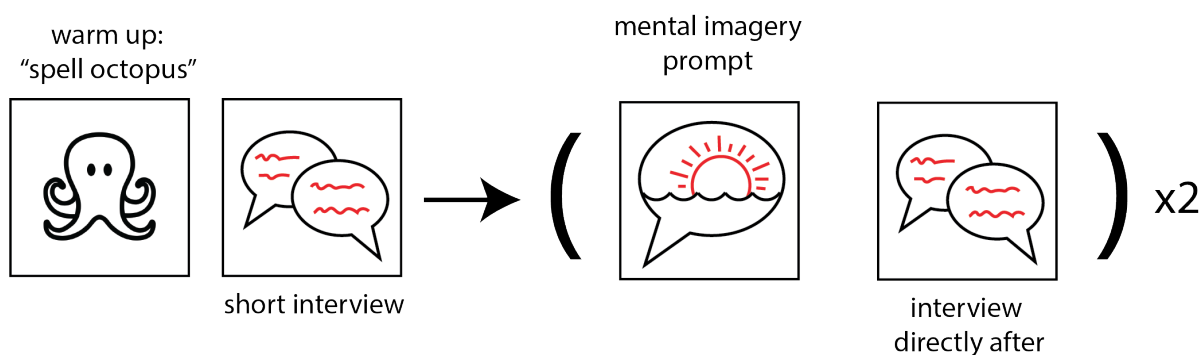
Fig. *7*

DES Training

DES Task

Fig. 8   **Micro-phenomenology Task**

You may note that the task wasn't quite the same for the DES and micro-phenomenology portions. The DES portion involved 32 prompts with random beeps interspersed, whereas the micro-phenomenology portion involved just 2 prompts, with interviews directly after. This is necessary so as not to distort the methods from their original intents. Since DES relies on short moments, it necessitates multiple samples and randomized ones. Interviews for provoked micro-phenomenology on the other hand are given directly after a prompt. Nonetheless, these two somewhat different tasks should be comparable, and we noted when comparisons were possibly compromised. For example, the DES portion involved more samples with inner activity unrelated to the task, possibly a result of the greater number of prompts. To sum up the research design:

> **Group 1**
> 3 days DES training in everyday life
> Task with DES:
>> 32 prompts
>> 5 random beeps interspersed
>> Interview after each beep
>
> Micro-phenomenology warm-up
> Task with micro-phenomenology:
>> 2 prompts (over the course of 2 days)
>> Interview after each prompt
>
> **Group 2**
> Micro-phenomenology warm-up
> Task with micro-phenomenology:
>> 2 prompts
>> Interview after each prompt
>
> 3 days DES training in everyday life

Task with DES:
    32 prompts
    5 random beeps interspersed
    Interview after each beep

Differences between methods

In the previous chapter, we noted differences between micro-phenomenology and DES. Here let's reiterate these differences as they pertain to the task at hand.

<u>Research goals</u>

For the micro-phenomenology portion, the research goal was to investigate the process of mental imagery formation. For DES, the research goal was to investigate inner experience during a mental imagery task. As we saw in the previous chapter, micro-phenomenology studies often have the goal of investigating a process—e.g. mathematical intuition (Van-Quynh, 2017), listening to music (Petitmengin, 2009), loss of self-boundaries (Ataria et al., 2015). DES never explicitly investigates a process. It can only look at inner activity *during* an activity. Usually, it investigates inner experience during the participant's everyday life, however it can also be used for tasks. So DES does not even presuppose that there is any mental imagery formation during this task (and indeed on some samples there wasn't). DES also makes clear that experience during a task may be markedly different from experience in everyday life. Mental imagery formation during a task may be quite different from mental imagery formation 'in the wild.'

<u>Temporal Extension</u>

DES looked at the short moment immediately preceding each beep. Micro-phenomenology looked at the entire 10 second period following each prompt. The time-span micro-phenomenology investigates depends on the experience at hand. Here, each prompt was followed by a period allowing for mental imagery formation, so it made sense to look at this entire period. Sometimes the span that micro-phenomenology investigates can be much longer. But we'll see that even with this scale, there are differences between DES and micro-phenomenology.

<u>Developing and Focusing Attention</u>

Micro-phenomenology, as we saw, involves re-enacting an experience. Questions guide interviewees back to the experience, and stabilize their attention. The goal is for them to relive the experience.

DES tries to avoid any re-enacting, holding that this can alter experience. The goal with DES is to, in a sense, 'freeze' experience directly prior to the beep. Hopefully, it can stay in memory without being re-created. Although Petitmengin (2011) argues that all

memory involves some recreation. In any case, DES necessitates training, since it holds that participants can't initially apprehend experience.

Retrospection

DES interviews were conducted directly after each beeped sample. Micro-phenomenology interviews were conducted directly after the 10 second period following each prompt. So differences in degree of retrospection weren't so drastic.

We should note that differences in retrospection between methods can be starker. As we saw, there are two flavors of micro-phenomenology—invoked and provoked. Invoked micro-phenomenology can involve an evocation of experience that was days or even years before the interview. With provoked micro-phenomenology, the interview directly follows a task—as in this study. So invoked micro-phenomenology involves a much higher degree of retrospection. We should note that any conclusions or generalizations from this study pertain only to provoked micro-phenomenology.

Interview questions

There are indeed some differences. For example, micro-phenomenology involves questions aimed at having the participant relive experience: 'I suggest you go back to the situation.' DES questions aren't aimed at this direct evocation: 'At the moment of the beep, what was in your experience?'

Micro-phenomenology asks about different sensory dimensions: 'When you are there, do you see anything?' DES aims to be non-directive: 'Was there anything else in your experience?' DES doesn't ask about specific senses but hopes that if participants experienced anything else, they won't forget to mention it.

There are similarities as well. Both methods press for further detail. For example, if there was a mental image, both ask questions on what the visual space of this mental image is like.

Results

We'll look at two participants as case studies. Then we'll turn to general findings.

Jelka

DES found the defining characteristic of Jelka's samples to be mental imagery with a dual vantage point. This was present for all five of the samples. This dual vantage point meant that all images were viewed from two perspectives simultaneously. For example, for sample 1, at the moment of the beep, Jelka had an image of skyscrapers in a skyline. From one perspective, it felt like she was in this scene, with the cityscape surrounding her. From the simultaneous second perspective, this image was in front of Jelka, as if on a screen about half a meter in front and slightly to the left.

For all images, Jelka had two vantage points at the same time—of being in the image and of watching it. The interview took pains to clarify that this was not simply like looking at an image with that image having a first-person perspective. Instead, it really felt like Jelka was inside the image at the same time as viewing it. Jelka admitted that in a physical sense this is impossible, but that this was the reality of her mental space. Previous DES sampling has found that inner experience does not always line up with presuppositions of physical reality (Hurlburt & Schwitzgebel, 2007). Mental visual space can be quite different from our physical field of vision. Jelka's samples are one example of this.

Micro-phenomenology did not find this dual vantage point. It found some other aspects of experience—for example, sonic elements could transfer from the recording to the image. But in terms of Jelka's visual space, findings didn't match DES's predominant finding.

Micro-phenomenology found Jelka's images to be detailed and clear. The first prompt conjured a scene as if on a huge TV screen, close to her. Though the screen was close, Jelka also felt that the children were farther away, roughly 10 meters. With the second prompt, Jelka felt like she was in the scene, as a passerby watching.

It could be that the dual vantage point was present in this sample too, but Jelka wasn't aware of it yet during the micro-phenomenology interview. Her reporting of the children being farther away than the screen hints at the possibility that the dual vantage point may have been present.

The dual vantage point aspect revealed by DES may be useful for the micro-phenomenology interviews. The DES training might have made Jelka more aware of her experience (and specifically these spatial aspects) than she was during the micro-phenomenology interviews. So to recall Petitmengin's argument (2006) that micro-phenomenology is more suited than DES to investigating the 'how' as opposed to the 'what' of experience—here it may actually be DES that found a 'how' that micro-phenomenology missed.

There are still other possibilities in terms of validity, however. Experience may indeed have been different for the two methods. Or Jelka may have misreported the dual vantage point for the DES samples. We cannot say for sure which of these possibilities holds, but we present them here for further consideration.

Fig. 8. Jelka's dual vantage point
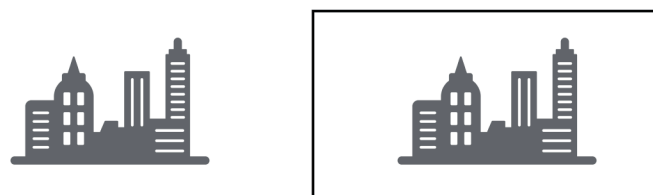
Anna

The main finding from micro-phenomenology was Anna's experience of actively trying to control the prompts and make them interesting. For example, take the prompt, "A child holds an ice cream cone with three scoops. The ice cream falls onto the hot pavement." Anna wanted to imagine something beyond the intended meaning. She imagined a boy holding just the cone in one hand and holding three scoops of melting ice cream directly in his other hand. Then she imagined three scoops to mean three metal scoop tools. She imagined a child holding three of these tools in one hand. She created these imaginative scenarios, stretching the prompt's meaning but always checking back to make sure the image technically 'fit' the description.

Another example is with the prompt, "A candle flickers in a dark room. A person sits down in front of it." Anna created a fanciful image of a man from the 17th or 18th century, wearing a powdered wig, sitting in front of the candle. She was surprised and amused by her image and checked that there were no contradictions between the prompt description and the image. Once she realized there were no contradictions, she accepted the image and felt excited. She then thought that she could imagine anyone she wants.

With this image, Anna felt that part of her was watching the scene like a movie and another part of her was directing it. She simultaneously felt like a watcher and director, passively viewing the scene and actively creating it.

DES didn't have any dominant salient finding for Anna's experience. There were some interesting aspects of visual space—for example, for one sample Anna had two parallel, simultaneous visual spaces, one of children skating on a frozen pond, and the other space where Anna was creating a face to add to the children. But there were no noteworthy broader patterns across multiple samples.

Anna did have one sample involving a cognitive component to mental imagery formation. For sample 4, Anna had just formed an image of a girl, but at the moment of the beep had no image at all. At this moment, she was thinking "I can imagine anyone." This was in the context that now she could form an image of anyone she wanted. There may or may not have been words to this thought. But if words were present, this would have been inner speaking, not inner hearing.

Here, findings from micro-phenomenology help situate this DES sample. In the micro-phenomenology task, Anna often played with the prompts. She imagined a man from the 17th or 18th century with a wig and thought: I can imagine anyone. She imagined a kid with three metal tools instead of three ice cream scoops. She frequently took control over the prompts, formed images for amusement, and compared them to the original prompt to check that they fit. Since micro-phenomenology was able to pick up on broader patterns of experience, it could clarify Anna's mental/behavioral landscape and help situate the DES samples. Of course, experience during the DES task may still have been different, but the

micro-phenomenological findings hint at what the broader experience of the DES task might have been.

As mentioned, this task may not reveal how mental imagery formation occurs in everyday life. We are simply comparing our two phenomenological methods in a standardized situation. This may show as much Anna's approach to new tasks and situations as it shows the way she constructs mental images. Her playful taking of control was something we observed over the three days of DES training. Anna often challenged and questioned the method—why certain questions were asked, for instance. We (and psychology in general) must keep in mind that participants can have very different approaches to tasks.

General Findings

<u>Micro-phenomenology</u>

Micro-phenomenology found that new elements either came with ease or required effort. Some elements came naturally. Examples are the candle image for Anna and the pond with three children for Jelka. Forming these images did not require much concentration. For all participants, most imagined elements came 'from nowhere' and appeared either (a) whole, all at once, (b) gradually, or (c) in parts, one thing at a time. Some elements did not come naturally and required concentration. One example is Jelka's image of a tree with birds in it. She commented, "my mind didn't do that for me." Another image requiring effort was Lara's image of a pond. She commented, "I really tried to imagine it."

Another finding was that elements either changed over time or remained stable. Most elements changed over time. For example, Anna's image of a child went from holding ice cream directly in his hand to holding three metal scoop tools.

One exception to elements changing was with Jelka's image of a bookstore. This stayed static, unchanging.

Added elements could either be coherent or incoherent. Sometimes added elements fit with the scene, for example Eva's image of a father at a dinner table, or of a girl wearing headphones. These elements belonged.

At other times, added elements were disproportionate, and didn't fit. An example is Jelka's tree with birds. It was too big, and a different color from the rest of the scene. It was an 'intruder.' Another example is Lara's image of a skate flashing over an image of a pond. The skate didn't fit with the pond at all. It was too big. It had different colors and was in a different visual style. Both the pond and the skate were cartoonish, but the skate was more 'retro.'

The task could evoke either freedom or constraint. Anna and Jelka felt freedom. Anna felt like she could imagine anyone. She felt like a magician with unlimited possibilities. Jelka felt like she could focus on whatever she chose.

But Jelka also felt constrained in parts. She had to imagine things she wasn't interested in (she compared this to reading a book for an exam, knowing she had to focus on certain elements). Lara had a similar experience, and reported thinking: "I have to imagine something."

The task also revealed or induced feelings. Some of these were unpleasant. Anna experienced the unpleasant cold sensation of ice cream in her hand. Jelka had the worried feeling of a mom watching her children skate. Lara had a feeling of nervousness, present throughout the task, although unrelated to it. Some good feelings were present as well. Eva felt happy during her interviews.

DES

The main finding from DES is the extent to which visual space and image formation can differ between participants or between samples:

— Images can have borders, no borders, or focus can be on the center so the participant is unsure of whether or not the image has edges.

— Imagery can involve movement or no movement. Movement can include zooming or GIF-like repetition.

— Images can be in a separate mental space or positioned over the real world, for instance on a "3D screen" (as with Lara).

— Subject positioning in relation to the image could be as if *in* the image, as if *looking at* the image, or for the case of Jelka, *both at the same time*.

— Mental images can involve aspects that would be impossible in real physical space.

— Two simultaneous visual spaces can be present at the same time, for instance with Eva's two simultaneous images. Or Anna's parallel visual space where she was forming a face to add to her main image.

— Certain areas can have some visual attributes (brightness) without colors yet being present (seen with Anna and Eva).

— Images aren't necessarily present immediately. They can be formed over time. This was the case with the formation of Lara's 3D screen. We also see this with Eva sensing aspects of images without any visual information yet being present.

These findings relate to past findings from DES. Hurlburt has noted that visual space does not need to conform to the requirements of real physical space (Hurlburt & Schwitzgebel, 2007). Field of view can be larger or smaller than the real-life 120-degree field of view. Images can contain multiple perspectives at once. Visual aspects can be present, without an image being 'seen' ('imageless seeing'). Certain visual aspects within an image can be indeterminate—faces can lack features, for instance. Images can be in a separate mental space or overlaid on the real world (Hurlburt & Heavey, 2006). There can be multiple images at once, or in the case of borderline personality or bulimia, even more than 10.

Images may also have no figure-ground distinction, going against the tenets of Gestalt psychology (Hurlburt, 1993). Inner images can be in color or in black and white (Hurlburt, 2011a). Images can be 'goofed up'—distorted, warped or scratched—as is often the case with schizophrenic individuals (Hurlburt, 1990). Images can have cognitive components, for example imaginary arrows while a participant is playing tennis. Thoughts and images can be combined. Feelings and images can be combined. Images can be realistic, cartoonish, or even completely abstract (Hurlburt, 1990). These are differences that Hurlburt and colleagues found spanning decades of DES research. However, even with a simple mental imagery task and four subjects, we found striking differences in how images were formed and how visual space was established.

Other general findings from the DES portion of this study are:

—Prompts could vary in the types of experience they elicit. Some, for instance, induced more feeling than others. For example, the prompt of a father serving food elicited antipathy for one subject and cynical amusement for another.

—Mental images don't always match the prompts.

—Non-task-related experience is relatively common (4/25 of samples).

These are all important for psychological experiments in general. Task experience may differ from everyday life experience. Participants' experience during tasks may also differ from what's expected of them. We propose that most foundational psychological tasks could benefit from phenomenological research of what experience of these tasks is actually like.

Comparison

Commonalities can be picked out from our respective findings. But overall, the general trends of findings are quite different. First, let's note some interesting commonalities.

Both methods dealt with the role of feelings in mental imagery. DES found that 1/5 of samples involved Feelings. Feeling, again, is a code that refers to emotional experiences. Two or more samples involved 'Thought / Feelings,' with more semantic content than typical feelings and more of an intuitive aspect than thoughts. Feelings were sometimes positive in valence ('calm') or sometimes negative ('dislike'). Feelings could also depend on the prompt, and one prompt in particular elicited a negative response: "A family gathers around the dinner table. The father starts serving food." This led to somewhat negative feelings for two participants.

Micro-phenomenology also found a variety of different interactions between imagined scenes and participants' feelings. For example, Jelka departed from the prompt and added a mother to the scene of children skating on a pond. She then projected her own worry for

the children to the mother. Here micro-phenomenology revealed the time-course of a feeling and how it interacted with added visual elements.

Both methods also uncovered certain common visual phenomena. One example of this is images with GIF-like repetition—revealed by both DES and micro-phenomenology. This may be something specific to our current digital age. These short, repeating moving images are common on social media. Schwitzgebel (2002) questions the validity of introspection since studies in the 40s and 50s reported most dreaming to be in black and white. He argues that the media around us heavily shapes how we perceive our inner life. We then misreport our own inner experience. But there's another possibility (though one can't be sure): maybe some people really did dream in black and white in the 40s and 50s. Hurlburt has sampled with a number of older individuals who have mental images in black and white (2011a). Maybe mental images are heavily influenced by the media we consume. For older people, that means black and white. For younger people, that may mean GIF-like repetition.

—

Findings also diverge between DES and micro-phenomenology. The main findings from DES focus on aspects of visual space. These were sometimes different from what micro-phenomenology revealed, including Lara's "holographic" 3-D screens on which mental imagery appeared, and Jelka's dual vantage point whereby she was both looking at an image and part of it. It's possible that task experience was different for these participants. It's also possible that, in at least some samples, one method uncovered phenomena which the other method wouldn't have.

For now, there's no objective measure with which to compare our methods to determine if one is more valid. The point of this study is to bring these methods together and ask: are there even differences? In which way do these differences trend? What can these differences say about further avenues of research in terms of assuring validity?

I see it as most likely that DES got closer to validity for certain aspects of visual space, like Jelka's dual vantage point images. Jelka simultaneously felt like she was in the scene and like she was watching it on a large screen. The micro-phenomenology findings hinted at this aspect but didn't explicitly arrive at it. Micro-phenomenology revealed that Jelka felt like she was looking at a giant TV screen right in front of her, but also felt like she was about 10m from the children she was viewing. This could be the same phenomenon as the dual aspect imagery, but less explicitly stated.

The main findings from micro-phenomenology focused on experience of the prompts and task as a whole. Prompts elicited a sense of freedom or constraint—DES did not find these aspects. Feelings were present in some DES samples, but not related to freedom or constraint. Micro-phenomenology also found that image formation either came naturally

or required effort. DES sampling found no such distinction. DES also did not find examples of added elements being coherent or disproportionate. It's possible that the temporal frame of micro-phenomenology allows broader dynamics to emerge. Possibly if DES samples fell at different points, they might reveal these same aspects. It's also possible (as Hurlburt has claimed) that certain reported aspects of experience can be retrospective fictions that never actually occurred in lived experience (Caraciollo & Hurlburt, 2016). A third possibility is that by examining the temporal dimension of experience, we can uncover phenomena that would not be present for any individual sample. These phenomena may be constructed as entities at a broader scale, but may not be visible in individual samples.

I believe that micro-phenomenology brought to the fore certain elements that the narrow temporal focus of DES missed. This is especially of note regarding Anna's playing with the prompts. She stretched the boundaries of what the prompts could describe, for example imagining a child holding three ice-cream scoop tools instead of three scoops of ice cream. DES samples hinted at this phenomenon but didn't fully arrive at it. For example, in one DES sample, Anna had the unsymbolized thought "I can imagine anyone." She was establishing to herself the boundaries (or rather lack of boundaries) of what this image could be. This is very similar to an element that micro-phenomenology revealed where Ana thought that she could imagine anyone. She controlled and played with prompts like a 'magician,' finding combinations that amused her. So what micro-phenomenology made explicit, DES merely hinted at.

In sum, DES revealed some aspects that micro-phenomenology didn't, like Jelka's dual vantage point images. Micro-phenomenology revealed some aspects that DES didn't, like Anna's playful control over the prompts.

There could be various reasons for these differences, for example DES's iterative training, or differences in retrospection, or different interview questions. But I think the main differences come from the scope of the methods and the temporal scale involved. These respective scales are still close! We can estimate DES to cover around 2 seconds and micro-phenomenology around 10. But even with these close scales, we still get differences! Let's go back to our haiku:

Each person unique
Different scale, different results
New models needed

We can cross out the second line (and no, we're not going in order, the syllables forbid it). So our methods could inform each other. Based on micro-phenomenology's revelation of Anna's playful control over her images, we can situate the DES sample, "I can imagine anyone." The broader temporal experience of the micro-phenomenology interviews may correspond to experience around the DES sample.

Based on DES's revelation of Jelka's dual vantage points we can perhaps make sense of Jelka's micro-phenomenology image where she felt like she was watching children on a TV screen but also felt like she was some real distance from the children. DES may have brought a precision that is useful for understanding broader experiential dynamics.

Is there room for a new method, allowing a greater role for temporality, but also allowing for iterative training, minimizing retrospection, etc.? In the next chapter, I will present a new method, dynamic Descriptive Experience Sampling.

Part II. A New Method

7. Dynamic Descriptive Experience Sampling

We've seen that DES and micro-phenomenology pursue different temporal scales and reveal different aspects. We've also seen that DES doesn't make temporality an overt part of the method, but does still tacitly investigate it. Let's look at some more examples where DES brushes up with time and is limited in dealing with it.

<u>The moment *before* 'the moment of the beep' can be important</u>

DES examines the moment before the beep. But the moment before this can also be important for understanding experience. Let's look at two examples from the DES training period of our Chapter 6 study:

Eva Sample 3.2
Eva had been writing a report. At the moment of the beep, Eva hears the word "Trump" from the TV in the other room. Everything else that was in her experience previously is gone. <u>Coding</u>: Perceptual awareness

The word "Trump" interrupts her previous experience. But to understand this 'Trump' experience, we need to understand her previous experience. We need to know that Eva was engaged in a task and was interrupted. The 'Trump' experience cuts off the previous experience. So to know the moment of the beep, we also need to know the moment before that. Another example:

Jelka Sample 3.4
Jelka was thinking about SARS-CoV-2 and how she wasn't really scared or panicking about it. At the moment of the beep, Jelka is innerly speaking, saying "I don't really feel anything" (in Slovenian). It's part of two voices in a dialogue and is lower-pitched than the other voice. It's slower than the other one. She thinks it's her voice but isn't entirely sure. It's in her head, with this location being more than strictly metaphorical. <u>Coding</u>: Inner speaking

To understand this moment, we need to understand that Jelka is engaged in an inner dialogue. At this moment, only one part of the dialogue is present—the inner speaking of "I don't really feel anything." But we need to understand that previously there had been another voice in the dialogue. We need to compare the two voices. The one present at the moment of the beep is lower-pitched than the other one. It's slower, too. So to understand the moment of the beep, we need to understand the moment before that. We need to examine these moments as a sequence. We see, again, that DES is 'referential,' not 'atomistic' (Hurlburt, 2011b). But if we're referring to the moment before 'the moment of the beep' then why not explicitly investigate it? This might improve our faithfulness in describing both moments. After all, when we describe the inner speaking here as slower and lower-pitched, we're also describing the voice from the moment before. We understand it as faster and higher. Why not make our investigation overt instead of tacit?

<u>The beep can interrupt a process</u>

DES attempts to look at 'the last undisturbed moment' before the beep (Hurlburt & Heavey, 2006, p. 68). However, the authors note that this description is imperfect since DES is also interested in moments that are disturbed, cut off by the beep. Let's look at some examples:

Susan Sample 5.3

Susan is looking at her eyes in the fMRI scanner mirror, noting the distance from her eyes to her eyebrows. She is saying to herself, "wish I looked like that standing," in her own soft inner voice with a slightly ironic or humorous tone. Simultaneously, Susan is beginning to attend to the symmetry of her eyes/eyebrows, but that is not (or perhaps not yet) a complete thought (abridged from Hurlburt et al., 2017, p. 4).

Susan is beginning to attend to the symmetry of her eyes/eyebrows. But this is not a complete thought at this moment. Hurlburt and colleagues write "perhaps not yet"—so this eyebrow aspect could potentially become a complete thought in the future. At this moment, nothing is certain. But we see a possibility for dynamics of experience. Some thoughts may form gradually so that, if interrupted, they're not yet complete. Let's look at another example, from my own sampling, with Faith.

Faith Sample 3.1

Faith is in the middle of formulating a thought about what's stressful about her master's thesis. This is without words, but rather consists of the content becoming clear. It's not yet clear.

She isn't feeling stressed at this moment. At one point in the interview she described feeling calmness, but more likely this was just an absence of feeling. <u>Coding</u>: Unsymbolized thinking(?)

At this moment, Faith's in the middle of a thought. If the beep had not interrupted, perhaps the exact content would have become clearer. As it is, we merely know the general topic—what's stressful about her master's thesis. As we see here and with Susan's eye/eyebrow thought, some thoughts may come gradually. In both of these samples, we don't know what would've happened had the beep not arrived. Would both of these have formed into more clear and complete thoughts? What exactly is the process of thought formation? Is there a way to make these temporal dynamics more explicit?

To be clear, dDES samples also have the possibility of being interrupted by the beep. But by looking at two moments, we can also look at temporal dynamics for the moment farthest from the beep. There's greater opportunity to observe dynamics, like thought being formed, experiential elements growing and fading, etc.

<u>There can be temporal dynamics within a moment</u>

Even within a DES moment, temporal dynamics are visible. For example:

Ali Sample 2.3

　　Ali has a mental image (inspired by the movie *I Lost My Body*) of a disembodied hand grabbing a pigeon's neck, about to snap it. This scene doesn't have borders. The hand, pigeon, nest, roof, etc. take up the whole visual field. The image is very clear.

　　Ali also has feelings of shock and surprise (described as separate but linked). The surprise comes first and involves Ali noticing that his mouth is open. This leads to the shock, which is felt in the chest, and as his heart beating faster. These feelings are intense. <u>Coding</u>: Image, Feeling(x2)

Ali described this as one moment. But within this moment, there are changes. The surprise comes first. Ali notices his mouth is open. Then comes shock, felt in the chest. Could this be separated into two moments, first the shock and then the surprise? It's possible. Perhaps separation of moments is arbitrary. But in any case, we need to make the investigation of temporal dynamics explicit if we're going to address this question.

Hurlburt and Heavey write that they don't know if experience is like a stream or like a "series of beads in a string" (2006, p. 71). Experience research needs to be able to answer fundamental questions like this. Does experience flow or is it divided into discrete moments? If experience research can't answer this question of the basic structure of our experience, then it may never grow into a mature science and may succumb to the same pitfalls as introspection at the turn of the 20th century. Crudely put, it could be doomed to failure.

Let's look at a new method that makes the study of temporality overt—dynamic Descriptive Experience Sampling (dDES). The goal is to examine the basic structure(s) of temporal consciousness. In the next chapter, I'll present common temporal patterns gleaned from 8 individuals. In the five chapters after that, we'll discuss the cases of five individuals. This idiographic description is the heart of the method. First, the rules of the game.

Method

dDES looks at not just one moment preceding the beep but two, as well as how those moments relate. Two moments before the beep isn't such a long period. It's the shortest span that allows for an overt view of temporal experience. So we keep the precision of DES, while letting time seep in.

dDES keeps many other aspects of DES. In fact, before the switch to examining two moments, our new method is *identical* to DES. Think of DES like an open-faced sandwich with one slice of bread, and dDES like a full sandwich with two slices. All the fillings are the same, there's just an extra added slice. Before switching to dDES, participants first train with standard DES. This follows the full procedure—6 beeps a day, after each beep jotting down experience, 1-hour interviews within 24 hours of beep collection.

Once participants can faithfully apprehend their experience, we switch to dDES. So once they can report on one moment, we switch to two moments. For the participants

here, this switch usually occurred after 3 days of DES training. With Matej, we switched after 2 days of DES training. After the switch, we pursue at least 2 more days of dDES sampling. 3 is preferable, and the more the better. With Max, for example, we had time for 4 days of dDES.

dDES again involves 6 beeps a day. After each beep, participants jot down what their experience was in the two moments before the beep. They also jot down the temporal dynamics of these two moments, and why they divided experience into those particular moments. The DES training has already built up an understanding of 'the moment before the beep.' This should help with an understanding of the moment preceeding that and the way these moments relate, although of course subsequent iterative training may be needed. An interview follows within 24 hours of the 6 daily samples being collected. This interview lasts around 1.5 hours. This is longer than the 1-hour DES interview, since there is more to cover. Any beeps not discussed within the 1.5 hours are discarded.
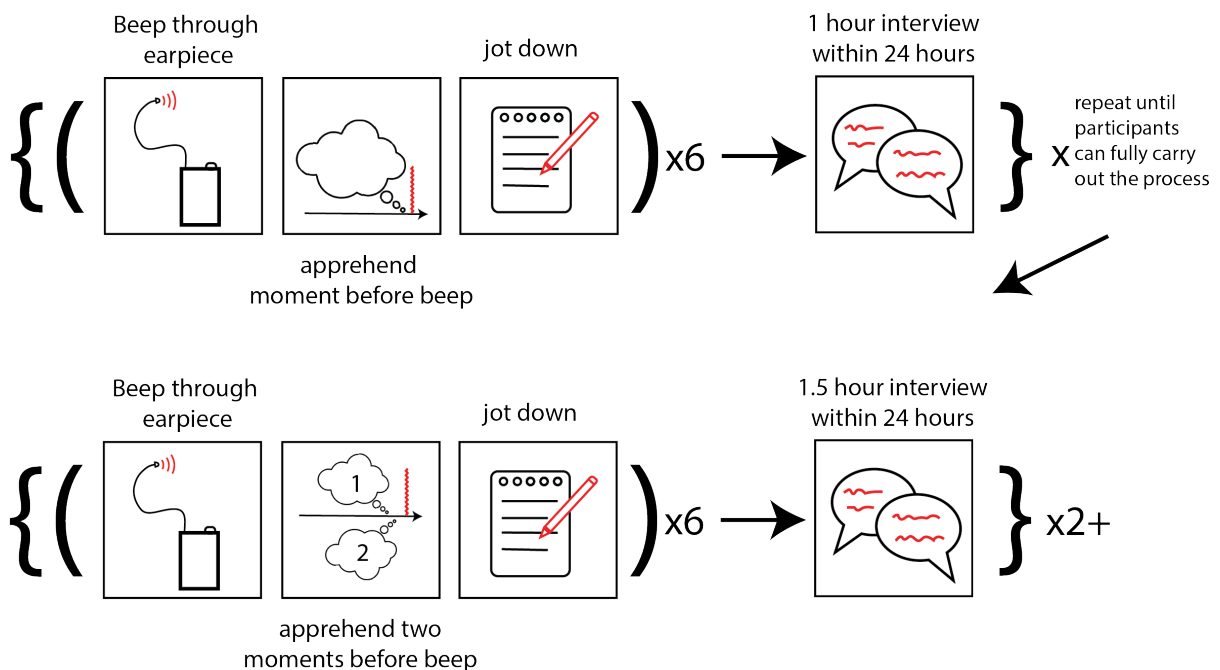

Fig. 9. dDES process

Like with standard DES, dDES aims to be as non-directive and non-inductive as possible. We don't want to bias or lead the participant. The procedure for the moment farthest from the beep is the same as the procedure for the nearest moment (and as described in Chapter 3). The interview pursues the "one legitimate question": "what, if anything, was in your experience at the moment?" (Hurlburt, 2011a, p. 161) We seek to avoid causal explanations (I must have been thinking X because…) and generalizations about experience (I always experience X so I was…) When these occur, we try to guide the participant back to direct experience. We ask questions pushing for greater specificity. If the interviewer

needs to give examples to help the participant's understanding, they must always offer multiple possibilities so as not to suggest any one answer, e.g. "Were there borders to the image, or no borders, or something else, or you don't know?"

After both moments are described, we switch to dealing how they relate. The interviewer must make it clear that they are not looking for any particular answer. A sample line of questioning may be "How do the two moments relate? And if there's no connection, you can say that as well. And you can say if you don't know." We are looking for the temporal dynamics of these two moments.

The interviewer must always make it clear that the division into separate moments may be arbitrary. The participant must feel free to voice if this is the case. If the participant does divide experience into separate moments, they should say why they chose the specific boundaries that they did.

Some participants say that dDES is much harder than DES. For example, Sophie (Appendix IC) wasn't confident of many of her samples. Participants should always feel free to voice uncertainty.

Other participants, such as Ali and Matej, say that dDES isn't harder to do than standard DES. To them, once you can do DES, you can do dDES. To other participants, like Max, dDES was harder but the difference wasn't drastic.

Once interviews are done, samples can be analyzed. As with DES, the researcher must separate out actual experience from fabrication, generalization, presupposition, causal explanation etc. Researchers must not take for granted that participants can easily describe direct experience. Much of what participants discuss is left out of the final sample.

Descriptions are written for each sample. Descriptions usually follow the format of a description of Moment 1 (the moment furthest from the beep), followed by a description of Moment 2 (the moment closest to the beep), followed by a description of the temporal dynamics of these two moments. It's also helpful to present these dynamics visually. For that reason, illustrations are provided here along with samples.

After descriptions are made for each sample, descriptions are made of the salient characteristics of each participant. This, again, is idiographic. It can rely on generalized codes that are present across participants. Or it can involve descriptions specific to the individual participant.

There are indeed certain patterns of temporal experience that occur across participants. Codes can be drawn from samples through inductive generalizations. In the next chapter, we'll see some common codes, and then delve into detailed descriptions of individuals. But first, let's look at some possible arguments against dDES.

Possible Criticisms

There are two main possible criticisms of dDES. The first is that Moment 1 (the moment farthest from the beep) might be too short and is obscured by Moment 2. The second criticism is that the method could involve too many memory demands. Moment 1 is forgotten by the time Moment 2 is described (or vice versa). Let's deal with each in turn.

First, the criticism that Moment 2 (M2) might obscure Moment 1 (M1). This could be supported by experimental evidence of backward masking. If two stimuli are presented in rapid succession, most subjects will be able to identify the later stimulus far more reliably than the first (Bachmann & Allik, 1976). When the distance between exposures of two shapes is between 30–90 ms, the second shape is accurately identified around 70% of the time, and the first shape, 45% of the time. Later reviews such as from Breitmeyer & Ogmen (2000) confirm the backward masking paradigm, though conclude that it is not a unitary phenomenon and depends on choice of stimulus and task parameters. But does it apply to our method?

This backward masking effect is strongest at 30 - 60 ms. However, here we are generally looking at longer durations. This may be a length where the backward masking effect wears off. At a span of 250 ms, the two shapes are both identified roughly 100% of the time (Bachmann & Allik, 1976). We'll see in Chapter 9, with Adrien, that the length of a moment can vary. But it's usually probably on the order of 2 seconds. This is hard to judge, but inner experience can be compared with overlapping physical actions, whose length we can estimate.

However, there can be shorter moments—probably much shorter than two seconds. So we do have to keep backward masking experiments in mind. We must keep in mind the limits of the method. Participants should be encouraged to outline the contours of their uncertainty. When they have any doubt about an aspect they're describing, they should voice this.

Now the second criticism. We saw that experiential moments are probably too long to allow for backward masking. But are they so long that they entail complications of memory demands? Could memory demands be too pronounced to apprehend both M1 and M2? Perhaps participants start by jotting down their experience of M1. By the time they're done, they've forgotten M2. Or vice versa, starting with M2 and forgetting M1.

This is a valid concern. The solution, again, is to encourage utmost honesty from participants. We would much rather have them tell us they don't remember or can't say with certainty than have them confabulate. As we'll see there were plenty of samples where participants indeed couldn't remember two moments. The fact that this uncertainty can be

voiced is of great use to the method. I was able to gain trust in participants' abilities to demarcate their own uncertainty. And when they, in turn, were confident of other elements, I grew more confident as well.

There is no easy response to these two quite valid criticisms. The dDES method is built with these criticisms in mind. You could say that it is built entirely around these criticisms. Standard DES training precedes any attempt to look at two moments. We want to train participants to apprehend experience as faithfully and as precisely as possible. Only when they can confidently carry out the DES procedure, do we switch to dDES. At all times, participants are encouraged to voice their doubts. With every question asked, they should be given an outlet to voice these doubts.

Validity of the method is then built up idiographically, as with standard DES. Do we trust the fidelity of experiential reports for participant A? If so, do we trust fidelity for participant B? C? D? As we move forwards and look at 5 case studies, ask yourself if you trust the fidelity of each description. In Part III, we'll investigate dDES in conjunction with a task that includes observable third-person measures. Ask yourself if you trust this 'triangulation' of first- and third-person measures. Through this network of observables, you can then ask if you trust the validity of dDES as a whole.

Sample Transcript

Let's keep these concerns in mind while we look at a fragment of a dDES transcript. Fully entering into the method is a great way to understand it. Let's skip to a good way through the interview. At this point, Moment 1 and Moment 2 have been established in a similar manner to standard DES:

Adrien Sample 5.6

Moment 1

For context, Adrien was on the toilet, reading about tribe on an island off India—the Sentinelese. An anthropologist had gifted them a pig and a doll. The Sentinelese had chased the anthropologist away and buried the doll and pig alive.

At the moment of the beep Adrien is reading the word "enterrer" in his head ('bury' in French). It's like inner speaking but a bit different since he was reading. It's more like being guided.

The word lingers. The whole word is contained in each instant and is continuous. This is similar to sample 5.5, where Adrien used the metaphor, "like looking at the sun, and the sun stays in your vision after."

The word pushes out other "parasites" of thought that were a very small part of awareness at the beginning of the moment. It creates "a vacuum." Coding: inner reading, 'parasites' of thought(?)

Moment 2

Adrien has an image. But he's not sure if it was really an image, since there wasn't quite a directly visual aspect. It's of a live pig and doll being buried on a beach. But rather than all of

these items being in the same scene, Adrien is experiencing the relationship between these items. There's the pig and the doll. There's the beach (he doesn't see the start or end). There's no water. There's a black background. There's the relation between the pig, doll, and beach (that they're being buried). There are visual attributes—items have color, and the sand is golden brown. But again, there may not be the actual visual aspect of seeing a mental image.

The image is also silent. There's no sound. And Adrien experientially feels this silence aspect. He compared it to just a regular image with no sound component: "It feels completely different. Even if there was no sound, the image would not be experienced as silent." Adrien also compared it to being in a soundproof recording booth. So again, this silence is a directly experienced aspect. <u>Coding</u>: imageless seeing

So the interview has already asked in detail about these two moments. In the first moment (farthest from the beep), we established that Adrien was reading a word, and this word lingered and pushed out other parasites of thought. In the second moment, Adrien had an image but without direct visual qualities. We could code this as imageless seeing. Adrien also experienced silence. This wasn't just an absence of sonic experience; it was a sonic experience of silence. These aspects can be a bit tricky to understand since they go against certain notions of physical reality. The goal of interviewing is to make sure the researchers understand such aspects of the participant's experience correctly.

The interview then seeks to find out how these two moments relate. The goal is to determine the temporal patterns that span these two moments. My comments, clarifications, and analysis are in bracketed italics. Note that this was the 5th day of interviewing, and Adrien had already demonstrated skill at sampling, ability to voice any doubts, and resistance to leading questions. For that reason, I was not as strict in my interviewing questions as is advisable earlier in the dDES process. Examples of this are noted.

Transcript fragment from Sample 5.6

[*About the "parasites" of thought in Moment 1*]

Me: All the other tiny things get pushed away by the word lingering. Were those tiny things still in this farthest moment [*moment 1*], in the beginning of it? Or before this farthest moment?

Adrien: So I started the farthest moment with me reading out-loud in my head, and when I'm reading, like, the word when I'm reading it out loud—I think there are like tiny parasites like other stuff, like previous thoughts or whatever, that are still there. I didn't report them, and probably wouldn't have been able to make out, but it [*the reading*] didn't feel like it was the only thing, and was like maybe 95% of my experience. And the lingering creates this sort of vacuum that empties everything. So, yeah, you can even divide this moment into two moments. And just keep the lingering as the farthest moment. I mean it's still a gradual process and there are still things being vacuumed throughout the lingering.

[*Interesting that he says you could divide moment 1 into two moments. One is with the reading and the parasite thoughts. The other is with the word lingering, but without the parasite thoughts. Part of the dDES process is acknowledging that boundaries of moments and between moments may be arbitrary.*]

Me: Yeah. So are they evacuated all at once, or you said it's gradual?

Adrien: Yeah gradual, it's like a—yeah gradual.

[*This establishes dynamics within moment 1. About 95% percent of Adrien's experience was of reading a word. But the rest was these parasite thoughts. These parasite thoughts disappear, creating a 'vacuum'.*]

Me: So the lingering gradually creates a vacuum, and these parasites of thought get push away-

Adrien: -Yeah…Yeah.

Me: Um and the lingering was like in the sample before [*sample 5.5 seen at the beginning of this thesis*] where it's like the whole word contained in an instant and it's continuous?

Adrien: Yeah, in that same sense. It doesn't feel like the word is being repeated over and over. It feels like the whole word is just bzzzzt staying there.

Me: Yeah. Alright. Ok so I guess we can talk about the transition now.

Adrien: Yeah, so the transition, I say, the image appears gradually, but it appears already fully formed. My perception of it is gradual. And then I wrote, "there is a deafening of my experience." Yeah. So my experience… so the word that is lingering—"enterrer"—is being deafened as well. It's gradually going down. And is silent actually. And so is the rest of my experience. So, so is all the noise I was talking about before. All of this is ssshhhtp. Being hushed. Or, yeah, deafening.

Me: Is there overlap where there's both the image and the word as it's disappearing? [*To be more rigorous I should have phrased this differently. 'Is there overlap? Or no overlap? Or something else?' However, I'd grown confident of Adrien' ability to be skeptical about his experience.*]

Adrien: Yeah, yeah. Definitely. They overlap.

[*Note Adrien' certainty here. We'll see that Adrien is not always certain. When he's unsure of something (such as the content of the 'parasite thoughts'), he'll note that. This is key to the process. Participants must be comfortable voicing uncertainty. But here, Adrien is certain of the word and the image overlapping. Notice the lack of 'subjunctification' in his speech. There are no pauses, no filler words, no false starts of sentences. As you can see in the interview preceding this there is a good deal subjunctification—probably because these aspects (parasites of thought) are hard to describe, and Adrien may not know certain details.*]

Me: Ok.

Adrien: But as I said, it's like… I mean it doesn't feel like I'm forming the image. It feels like I'm looking at something that's already there, but I'm forming my perception. This gradual arriving of the image is not the image arriving gradually, it's my perception of it arriving gradually. So I get *all of the things at the same time,* but with more and more vivid—vividness. Or with more and more presence, or some word like is.

Me: Yeah. So let me just run through it. In the first moment—actually second moment according to you, the farthest moment [*what I call moment 1, Adrien calls moment 2. For him, moment 2 is furthest from the beep. Such terminology doesn't really matter, and I try to use the participant's terminology. But it's good to keep track so as not to be confused. I most often use the words 'farthest moment' and 'closest moment' because they're the least ambiguous*] there's the word "enterrer" [bury] out-loud in your head, like inner speaking [*or inner reading*], and then it lingers, umm, kindof contained in an instant, lingering, and pushing out all the other chatter, parasites of thought that are there, creating a "vacuum" as you call it. And then it fades away as the image comes in. The image is already formed, but your perception of it is increasing. Yeah, so it's like it's already there but you're forming your perception. So the image—so what happens to the image over the moment, by the beep? Does it continue to form? Or is it stable by the end or what? [*To be more rigorous, I should have added "Or you're not sure?"*]

Adrien: Stable by the end. It gets stable and stays stable. [*Confident here again, with no subjunctification.*] And then it beeps.

The interview continues to clarify some of the elements we talked about. But this section shows the main elements. We learn that there's some overlap where the inner reading disappears and the imageless seeing enters. We learn that the 'parasites' of thought disappear during moment 1, and there's some time where the word lingers without any of these 'parasites.'

Note that we can track subjunctification across this interview. Subjunctification, again, refers to pauses, false starts, and filler words. Subjunctification was quite present in some sections of the interview—for example describing the parasites of thought. To Adrien, this aspect of experience was difficult to describe. Indeed, it's not a common experience across DES and dDES samples. At other moments, subjunctification substantially decreased. These moments include: describing overlap of the word and the image, and describing the image staying stable once it appeared.

After this interview, we can reach this temporal description and illustration to accompany the descriptions of Moment 1 and Moment 2:

> Temporal
>
> Adrien read "enterrer". The word was continuous, lasting. It pushed out all the "parasite" thoughts that were at the beginning of the moment.
>
> The word disappeared and was replaced by the image. There was overlap where both the image and word were present.
>
> It didn't feel like Adrien was forming the image. He described it like "I'm looking at something that's already there, but I'm forming my perception." So he was seeing all the things at the same time, but with "more vividness" or "more presence." The image got stable and stayed stable until the beep. The silence came when the word disappeared. Everything else that was in experience was also hushed.
>
> Coding: Cross-fade

Fig. 10
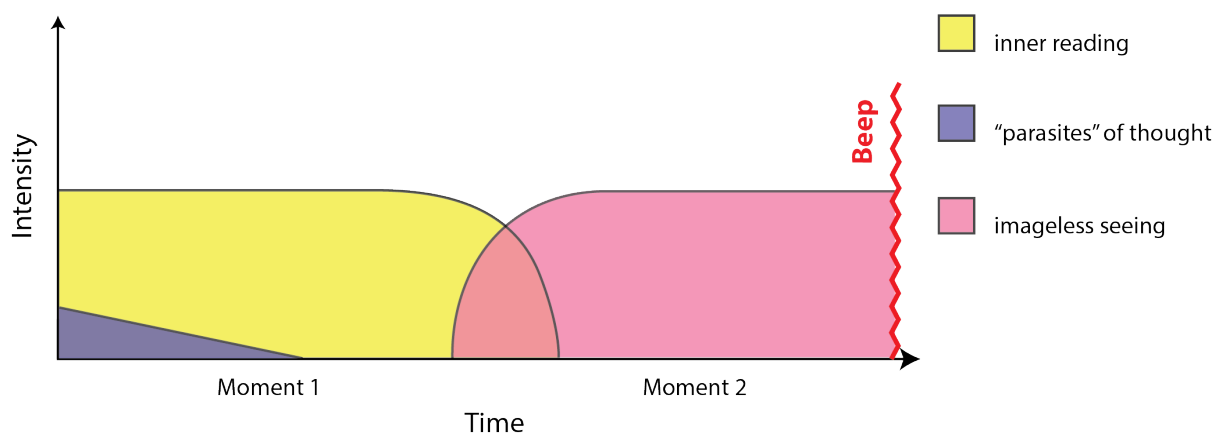
Coding samples is a part of analysis. The word disappeared while perception of the image entered. We can call this phenomenon a 'cross-fade.' We'll see that this coding is also useful for other samples, so can become a generalizable pattern.

We also saw that the division into moments is somewhat arbitrary. M1, farthest from the beep includes the word "enterrer" which pushes out other parasites of thought. Adrien mentioned that this moment could even be divided into two moments—one with the parasites of thought, and the second when these parasites are gone. So what we've presented here as two moments could even feasibly be three moments. This division doesn't so much matter. What's important is to understand experience as faithfully and possible. The division into moments is merely a mnemonic to help this process. It's a tool that can be discarded when no longer needed. Adrien notes that M1 here is arbitrary. There are temporal dynamics within this moment.

<center>❃❃❃</center>

We've seen that standard DES does tacitly incorporate time. It is referential, not atomistic. We can refer to broader experience to situate 'the moment of the beep.' There can also be temporal dynamics within a moment. dDES makes these temporal dynamics overt. We can see how processes unfold in time. We saw one example of this with Adrien. He read a word which then lingered over time, the entire word contained at every instant. This lingering word pushed out parasites of thought, and the word in turn then disappeared, resulting in the experience of silence. The disappearing word overlapped with the appearance of an image. Here we're not looking at one snapshot of experience. We're looking at an intricate arrangement—a tapestry of thought, words, and images; threads weaving around each other.

Next, we'll look at temporal codes that have been generalized from our 8 participants. Then we'll look at 5 case studies. In this section, you may feel overloaded with specificity. But this, again, is the heart of the method—focusing on individuals and individual moments in time. Hurlburt compares the idiographic nature of DES to learning music (1990 p. 70). He laments that those who study music are expected to listen to and learn entire symphonies, sonatas, concerti, but there's no such expectation with those studying psychology or consciousness science. Think of our case studies as the music.

8. Codes

What follows are codes for temporal dynamics gleaned from samples from 8 participants. After all sampling was conducted, commonalities emerged for how experience changed over time. Some codes show how Moment 1 and Moment 2 relate. Others show change within a moment. Others show how new experiential elements entered or vanished.

These are the main categories, although other idiographic categories emerged. The examples given are simplified to show just the relations we're interested in, not the entire sample. In reality, one sample may contain many different elements and transitions.[23]

The x axis represents time before the beep and the y axis represents intensity. Note that the axes on the graph are estimates and not to be taken too literally. It's not possible, for the moment, to note the exact time that internal processes take. So the time axis represents an estimate of objective duration based on subjective duration. The axis for intensity indicates how present certain mental elements are in awareness. But note that 'intensity' is not any one specific thing but a category grouping multiple properties of mental elements—the degree to which they're in the focus of awareness, perhaps based on how vivid a mental image is, how loud inner speech is, how occupying unsymbolized thinking is, etc.[24] Sometimes, for example, a participant might estimate that about 90% of her sample experience was inner speaking and 10% was an image. Inner speaking then would be much higher on the intensity axis. Still, there are no units on these axes, and the placement of elements is relative to other elements on the figure. Comparing intensities between two different figures may not be so fruitful.

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[23] Percentages are counted from our main sampling period. This means they exclude samples from the free will task.

[24] We'll see that the code Focusing/Unfocusing breaks from the pattern of an element's intensity roughly matching its presence in awareness, and so will be displayed differently.

Emerging: An experiential element enters. Most samples had some aspect of emerging or disappearing.[25]
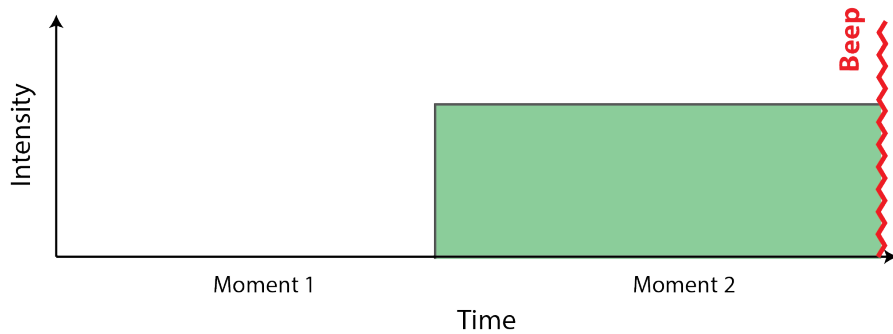

Fig. 11

Subcategories:

    Emerging / gradual

    Emerging / abrupt

    Emerging / unspecified

Example from Faith Sample 6.2: Faith had an unsymbolized thought that God was being patient with her. This emerged abruptly, all at once. It could be subcategorized as Emerging / abrupt.

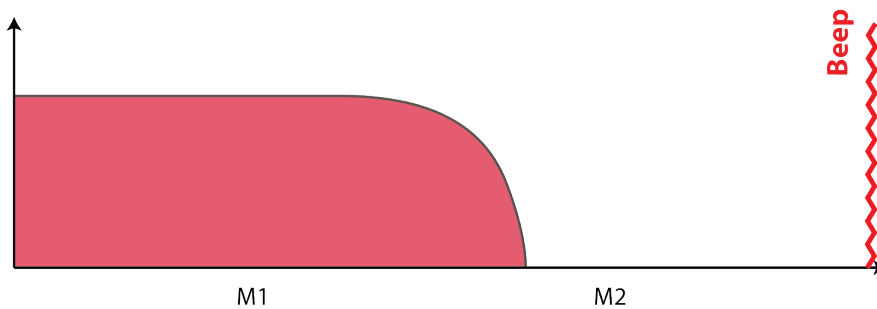**Disappearing:** An experiential aspect disappears.

Fig. 12

Subcategories

    Dissapearing / gradual

    Disappearing / abrupt

    Disappearing / unspecified

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[25] Frequency not specified since it's a bit of a catch-all category. For example, the category Switching could be seen as abrupt Disappearing followed by abrupt Emerging. The category Cross-fade could be seen as 'Disappearing / gradual' overlapping with 'Emerging / gradual'. Experiential aspects that don't fit into other categories generally fit under Emerging or Disappearing.

Example from Clara Sample 5.2: In Moment 1, Clara had the unsymbolized thought: am I forgetting to text Alvaro something? This thought disappeared and wasn't present in Moment 2. Clara didn't know exactly how it disappeared so it would be subcategorized as Disappearing / unspecified.

Overlapping: One experiential element carries across two or more moments. Other experiential aspects may vary during these moments. <u>Frequency</u>: 21 samples out of 84 total. 25% of total samples.
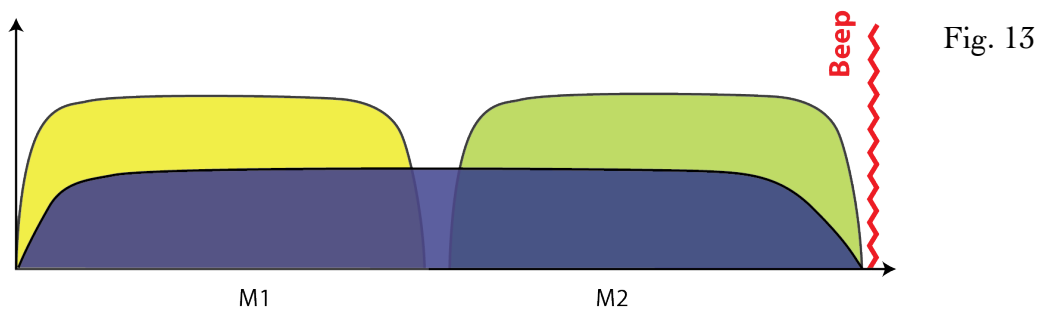

Fig. 13

<u>Subcategories</u>:
    Overlapping / growing
    Overlapping / diminishing
    Overlapping / constant
    Overlapping / altering
    Overlapping / unspecified

Example from Nora Sample 6.2: Nora had a feeling of stress in both M1 and M2. This was felt as pressure in her chest, in a small rectangular shape. It was constraining and squeezing. It was also cold (she described this as between metaphorical and literal). Other aspects (like inner speaking) varied throughout the two moments, but the stress stayed pretty much the same. It could be subcategorized as Overlapping / constant.

Transformation: An experiential element in M1 transforms into a somewhat different one in M2. The shift is not drastic. <u>Frequency</u>: 8% of total samples
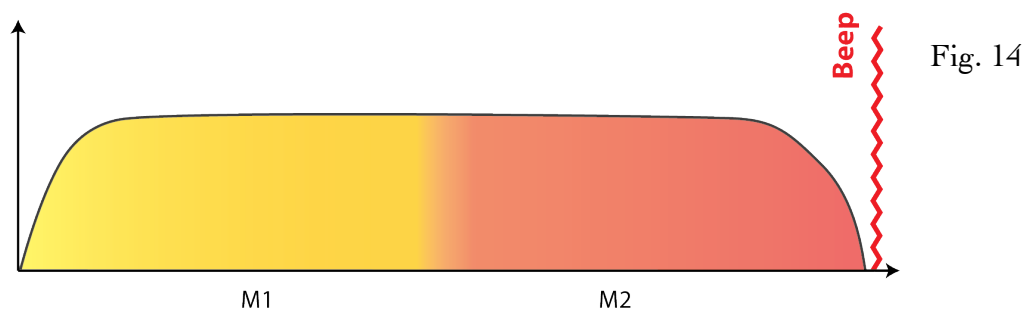

Fig. 14

Example from Matej Sample 3.1: In M1, Matej innerly heard something, although he wasn't sure what, and it wasn't so clear. This inner hearing had a clear location, however. It was in the front part of his head, more on the right side, in a thin band stretching across. This location moved to the middle right side of his head in M2. It manifested as inner speaking of either the word "consolidation" or "acquisition." The location spread out rapidly, filling the whole head. The M2 inner speaking was directly linked to M1 inner hearing, it was not separated.

Switching: There's a clear and abrupt shift between experience in M1 and M2. Frequency: 21% of total samples
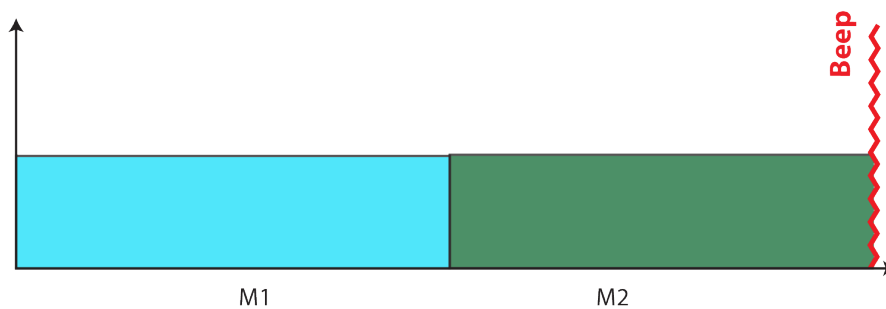

Fig. 15

Example from Max Sample 4.2: In M1, Max was listening to a song and singing the word 'seem.' In M2 Max heard the bass-line enter. Max's experience switched from the singing to the bass-line as soon as it entered.

Interruption: Here the switch between M1 and M2 is even more abrupt. M2 completely overtakes M1. Frequency: 2% of total samples
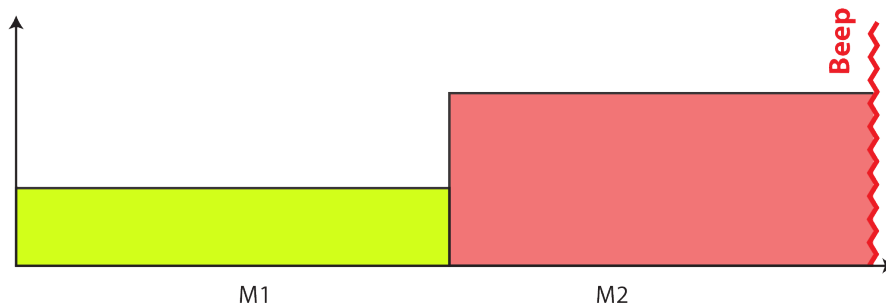

Fig. 16

Example from Ali Sample 4.4: In M1, Ali was thinking about if he should clean and pack, or if he should wait for his boyfriend to help. This involved some verbal elements—words like "clean" and "pack" and an image of his boyfriend. In M2, Ali noticed and was surprised by all the crumbs on his bed. This M2 surprise made all the strands of thought in M1 drop immediately.

Cross-fade: An experiential element fades out, while another fades in. <u>Frequency</u>: 8% of total samples
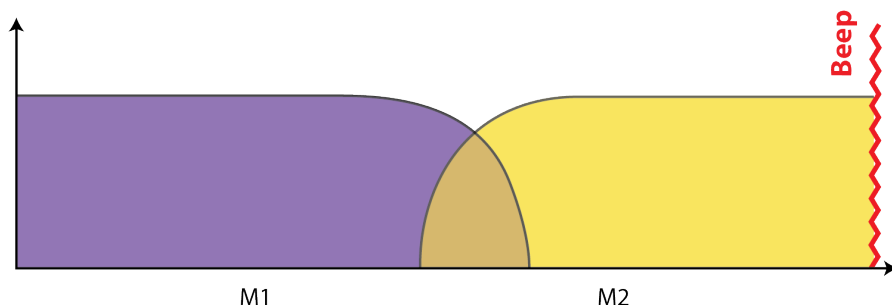

Fig. 17

<u>Example from Sophie Sample 6.2</u>: In M1, Sophie was reading the first part of a sentence about Aristotle. She had a thought/feeling that the sentence was going to be really complicated, and mild fear that she was going to feel dumb. In M2 Sophie read the rest of the sentence and had the thought that she was disappointed and the sentence wasn't as smart as it seemed. There was time when both the M1 thought/feeling and the M2 thought overlapped. The M1 thought/feeling decreased while the M2 thought increased.

<u>Variation — L Cut</u>: One experiential element cuts in or out suddenly. However, the element in the other moment fades in or out gradually. <u>Frequency</u>: 1% of total samples

Focusing or Unfocusing: An experiential element becomes more present in awareness without out necessarily increasing. <u>Frequency</u>: 5% of total samples
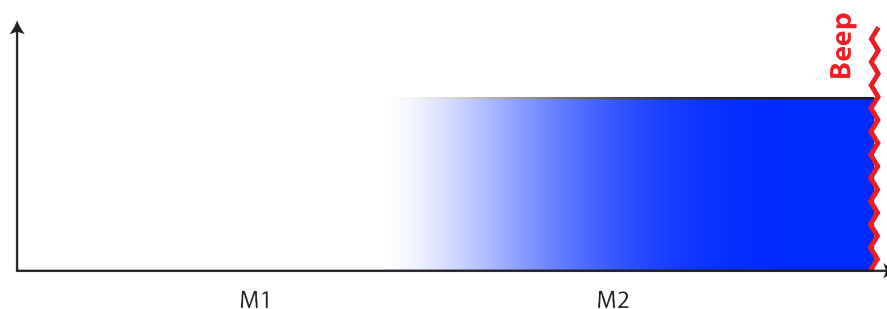

Fig. 18

<u>Example from Nora Sample 5.4</u>: In M1, Nora felt hot and annoyed. In M2, she felt tired and exhausted. The hot sensation and annoyed feeling from M1 continued into M2, they just weren't the focus of Nora's experience. It didn't make sense to say they had diminished, but they were less present in awareness. This could be coded as Unfocusing.

Grace note: A very short element of experience between two moments. It's not long enough to be qualified as a 'moment of experience' in its own right (although this is a judgment call, from both the researcher and participant). <u>Frequency</u>: 2% of total samples.
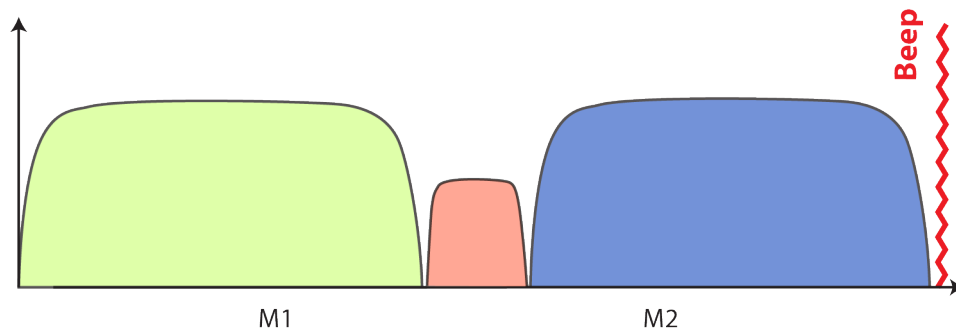

Fig. 19

<u>Example from Adrien Sample 4.5</u>: In M1, Adrien was singing and had the unsymbolized thought that he still hadn't received a DES beep. In M2 Adrien was singing and had the thought: should I play chess? Between these two moments was an intermediary unsymbolized thought with the content: why are you on your smartphone? It was only very slightly in experience and was very fast. To Adrien, it didn't make sense to count it as its own experiential moment.

Buffer: Time between two experiential moments with no experience. <u>Frequency</u>: 3% of total.
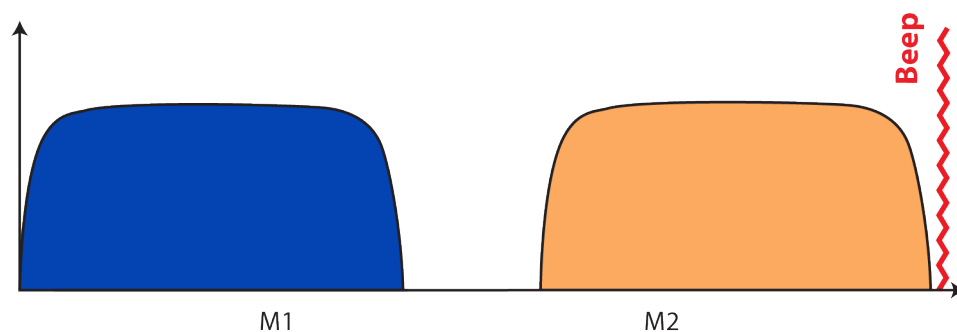
Fig. 20

<u>Example from Max Sample 4.1</u>: In M1, Max's experience was of sliding his hand up his guitar fretboard. In M2, he was experiencing the decay of a guitar note he just played. However, the actual note, between M1 and M2, was not in his experience. There was a gap between M1 and M2 where nothing was in Max's experience (although to be rigorous, there's always the possibility of faint experience or unremembered experience).

Rapid Fluctuating Awareness: Experiential aspects occur rapidly one after the other. It doesn't make sense to participants to call each of them a separate moment. A number of them can cluster into something resembling a moment. <u>Frequency</u>: 3% of total.

Fig. 21

Subcategories:

    Sequential—Experiential aspects enter rapidly one after the other

    Overlapping—Experiential aspects overlap with each other

    Semi-overlapping —A mix of sequential and overlapping
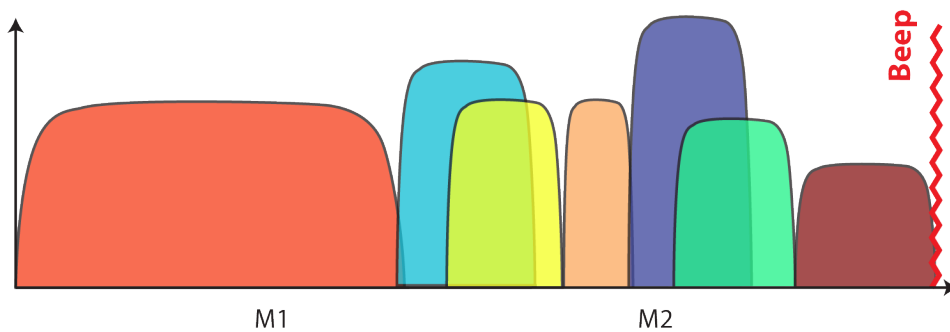
Example from Ali Sample 4.3: Ali was reading a text message. In M1, Ali had the thought: I don't need to reply, "or should I?" The "or should I" component was innerly spoken. In M2 Ali had a number of experiential elements occurring very rapidly. Ali took a sip of coffee and noticed the bitterness and lack of sweetness. The lack of sweetness was a sensory thought with the content "this is not so sweet" but without words. Then Ali noticed a dog and person on the balcony across. Then Ali thought about the person he was texting being nice. Then Ali innerly spoke "that made me smile" in his voice, with normal vocal characteristics. Then Ali thought that the person was giving good vibes. This had a thinking and feeling component to it, though no bodily localization. Since everything in M1 and M2 occurred extremely rapidly it could be called Rapid Fluctuating Awareness. Since some elements overlapped and others didn't, it could be subcategorized as semi-overlapping. It was hard for Ali to tell exactly what overlapped and what was sequential.

Intra-moment change: This is a somewhat different category and refers not to dynamics between two moments but to dynamics within one moment.
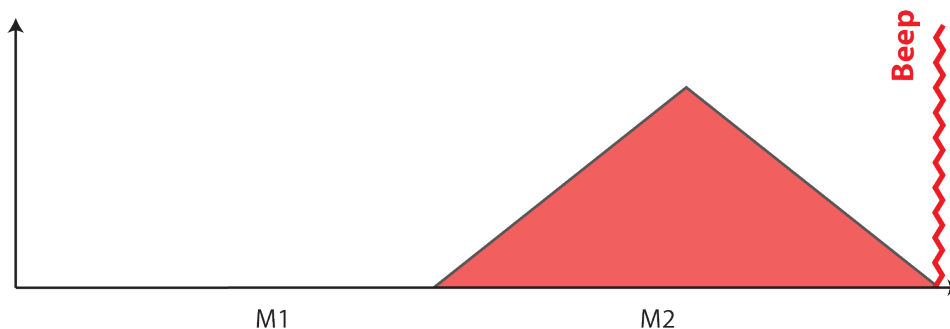
Fig. 22

<u>Subcategories</u>:

    Rise—An experiential aspect increases throughout one moment

    Dip—An experiential aspect decreases throughout one moment

    Spike—An experiential aspect abruptly increases then decreases

    Miscellaneous—There are a great number of other possibilities

<u>Example from Matej Sample 5.3</u>: In M2, Matej experienced anger at his supervisor (for blowing him off and not sending an important piece of data). This anger rapidly grew and then receded within that moment.

<div align="center">❈❈❈</div>

dDES is still in its infancy. With more samples, other codes may appear. Some of the codes above may no longer prove useful.

The codes above have been isolated and abstracted from real samples. In the next chapters we'll turn to real life samples, often with multiple codes at once, or elements that can't be neatly coded. These five case studies of individuals show the messy glory of temporal experience caught in action, before it puts on makeup #nofilter

9. Adrien

Momentary Experience

Adrien is a male 24-year-old cognitive science master's student from France. He has a PhD position in cognitive neuroscience lined up. Adrien was a careful observer of experience, applying his skeptical scientific outlook to the process.

For these case studies, we'll first look at salient features of experience for individual moments and then look at salient features of temporal experience.[26] Delving first into momentary experience helps us better understand temporal experience. We can first see the salient features of a participant's experience. Then we can see how these salient features are arranged in time—how they grow, recede, or otherwise alter over time.

Some samples were difficult to apprehend. Adrien didn't always know what was in his experience. But he was skilled at DES in that he always voiced his uncertainty. From the first day, he was skilled at locating the moment before the beep. The samples that he *could* describe, he described with precision. He left out causal explanations and generalizations about his ongoing activities. But some samples he couldn't describe. One possible reason is that memory issues made sampling difficult. Another possibility is that experience itself was often vague and not clearly defined. An example of a difficult sample:

> **Sample 4.2 Moment 1**
> Adrien is having an imaginary conversation in his head. It's with his PhD supervisor in LA. He wasn't sure of the exact content but knew the general scenario. They are supposed to talk about the paper he's reading, and which he hasn't finished. He called this experience a thought/feeling. It has a stressful quality to it. This doesn't have a separate bodily location. The thought had qualities that made it harder to remember. Adrien called it, in turn, "rough," "sketchy," "misformed," and a "draft." So the difficulty recalling wasn't just a problem of memory. The thought itself had qualities that made it harder to report. Coding: Thought/feeling

So here we see that experience itself is "rough" and "sketchy," making it difficult to recall. This isn't merely a problem of memory. But this doesn't preclude memory being an issue for other samples. With Sample 5.2, annoyance interfered with Adrien recalling the sample. Adrien was applying for a Visa and the website wasn't working. His annoyance made it difficult to remember his exact experience. Adrien also called his thinking "not structured" and "all over the place." So here it seems that both his memory and the thinking itself made the moments before the beep difficult to apprehend.

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[26] The individual moments in question may come from the DES period, or from the dDES period. However, even for the dDES moments, we'll first look at them absent of their main temporal component. Then in the second part of each case study we'll explicitly look at temporal experience.

Other kinds of experience were also difficult to apprehend. For example, in Sample 4.3 Moment 2, Adrien was laughing. He couldn't tell how this was experienced—as a feeling, as a sensory aspect—he just couldn't tell.

Altogether, Adrien's "rough," "sketchy," "not structured," and "misformed" samples aren't just a glitch in the method. They're a salient feature of his experience. Sometimes his experience itself isn't clear. Roughly 15% of his sampled moments were unclear, rough, etc. This was the highest percentage of all participants. For example, Matej never reported moments where experience was unclear.

These samples are interesting from a temporal perspective. Might rough and misformed experience become clear later? If the beep hadn't interrupted, might these elements have formed into clear, well-defined thoughts? This is a possibility. With dDES, we did find some elements of experience emerge gradually, not all at once. It's possible that if the beep had come earlier, these elements would have been apprehended as rough and unclear.

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Let's look at other salient features of Adrien's experience. We can compare features of his experience to the five frequent phenomena of experience found by Heavey and Hurlburt (2008). Their study conducted DES with 30 participants in order to find averages of the main features of experience (at least as they pertain to college students). Note that totals don't add up to 100% since multiple elements could be in experience at once, and other codes not listed could be present as well.

Frequent Phenomena	**Adrien** (% of total)	**Average from H&H 2008** (%)
Unsymbolized Thinking	21	22
Sensory Awareness	21	22
Feeling	13	26
Inner Speaking	9	26
Images	0	34

We see that Adrien' degrees of unsymbolized thinking and sensory awareness are comparable to the averages from Heavey and Hurlburt (2008).[27] An example of unsymbolized thinking is in Sample 4.5 M2, wondering if he should play chess. This is without words,

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[27] dDES may make averages of these values less accurate than standard DES. When an aspect overlaps in both Moment 1 and Moment 2, this might lead to a higher estimation of its average, since these two samples are not independent. For that reason, standard DES is preferable when one wishes to know percentages for codes of momentary experience. dDES can provide reasonable heuristics however. Another option is to only include either Moment 1 or Moment 2 in averages, but not both.

images, or other symbols. An example of sensory awareness is in Sample 3.6, noticing the feeling and sound of air leaving his lungs.

Adrien had a below-average amount of feelings, inner speaking, and especially images. He did have some instances of imageless seeing, as we saw in the last transcript excerpt. This involved aspects of imagery, but without an explicitly visual component.

Another salient feature of Adrien's experience could be coded as cognitive doing, taking up 15% of his experience. This is high. Heavey and Hurlburt (2008) don't give a specific percentage for this code but note that other codes besides the 5 frequent phenomena they observed didn't occur more than 3% of the time. A sample that includes cognitive doing:

> **Sample 2.1**
> Adrien is playing guitar. He's innerly making a rhythm. It's in his voice and goes "tadum dum tadum dum." It has pitch and intonation as part of it.
> He's also concentrating on which direction to move his hand. This is more a thinking aspect than about the movement itself. There aren't images or words to it. It's connected to the innerly spoken rhythm.
> He's also hearing the sound of the guitar, but this is a small part of experience.
> <u>Coding</u>: Inner speaking, cognitive doing, perceptual awareness

The concentrating on which direction to move his hand could be coded as cognitive doing. It's connected to the rhythmic aspect, so wouldn't best be called unsymbolized thinking. It's part of an active process. Another example of cognitive doing is Sample 3.6 when Adrien is writing and thinking about what to replace deleted text with. Here again, a thinking component is part of an active process. Adrien frequently had cognitive components that were part of ongoing activity and couldn't fully be separated from this activity.

Let's remember, though, that coding does not fully encapsulate experience. There are always border cases that are difficult to categorize. Some instances of cognitive doing are quite close to unsymbolized thinking. Others could be close to the category 'doing.' Categorization can serve a function, but it's important not to push its role too far. Reifying codes can reduce the experience they aim to describe. We'll look at issues with coding in Chapter 14. For now, suffice to say that for momentary experience I'm largely using codes introduced throughout the DES literature, with a few variations. Creating new codes is not uncommon in DES research. Codes have to adapt to the unique nature of individual experience. Codes serve the faithful understanding of experience, and not the other way around—our categorizations of experience don't serve to reinforce established codes.

Another salient feature of Adrien' experience was disconnected modality. Adrien experienced imageless seeing, soundless inner speech, soundless inner hearing, and soundless listening. We already saw examples of imageless seeing with Sample 5.5 in this thesis's introduction and sample 5.6 in the previous chapter. Respectively, Adrien had an image of a

vegan steak, but without any information that made it explicitly visual. And he had an image of a pig and doll buried on a beach, but without any explicitly visual aspect. It's of note that in these cases, there are still visual attributes. Items can have color—golden brown sand, a green and brown steak. But even with these visual attributes, nothing is explicitly seen. This isn't just the distinction between actually looking at something and having a mental image. As we'll see, other participants do have quite clear mental images that *are* explicitly seen. Adrien doesn't. At least not in the samples gathered here.

Hurlburt and Heavey note the presence of imageless seeing as well (2006, p. 229). The phenomenon is robust enough, across numerous participants, to earn its own code. But this code can be a bit confusing. It might make better sense to call this phenomenon a seeing-less image, since the image is present, just not explicitly visual attributes. Terminology is hard, and we often lack the vocabulary to talk about inner experience. Many aspects of experience are rarely described, in research or in conversation, and so the terminology we develop can be confusing and even paradoxical. 'Imageless seeing' in fact brings together two seemingly contradictory terms. But as we've seen, both these facets can indeed coexist in experience.

Adrien had other instances of what we've termed 'disconnected modality' where explicit sensory aspects are lacking from experience where they might be expected. For example, in Sample 4.2 M2, Adrien is reading the word "interpretation." He's reading on the page and in his head. This is like reading it out loud except there are no sonic qualities—no pitch, tone, etc. Note that this isn't just the difference between inner speaking/reading and regular speaking/reading. Adrien had other samples with inner speaking that did have clear sonic qualities. This sample did not. And yet, it didn't make sense for Adrien to call it soundless. He was still mentally voicing the word.

Another experience, we could call soundless inner hearing. In the first moment of Sample 5.3, Adrien was watching a video. There wasn't any sound yet, but colored bars were moving towards a line. When they reached the line, they would sound as notes, and Adrien was imagining what that sound would be. This had some sonic qualities—it was low pitched and sizzled. But again, it wasn't explicitly heard (even innerly heard). There was nothing that made it actually sonic. We'll see what happens experientially in the next moment when the sound does come in. But for that let's switch to our examination of consciousness over time.

Temporal experience

In the second moment of Sample 5.3, the colored bars hit the line, turning to music. Adrien heard the sound that he tried to imagine in M1. He was concentrating on the sound but heard it without any sonic particularities. These sonic qualities came after the beep. He

described it like looking at a text in a foreign language. After the beep, he knew the language and could understand it, but not before. He described, "if I had died at the moment of the beep, I wouldn't have been able to say that I experienced what it sounded like." So in M1, we had inner hearing without sound. Here we have listening with sound.

Isn't this contradictory? Doesn't 'listening' imply sound? Not necessarily in experience. Experience has its own logic. Images can be present without seeing, listening without sound. Sensory experience can involve disconnected modality—the ghostly remnants of sensation without sensory information. Perhaps there are different neurological/cognitive processes for the recognition of an image or sound and the actual sensory experience of these. DES doesn't make direct claims about the neural underpinnings of experience. But it's of interest that these experiences of disconnected modality occur for multiple participants. For Adrien, they're a salient feature of his experience.

And with dDES, we can see how they unfold over time. Inner hearing without sound turns into listening without sonic qualities. So even when the sound from the video does come in, it's still not directly sensed. With dDES, we can see how this experience of disconnected modality alters, while still retaining this disconnection.

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For Adrien, we switched to dDES after 3 days of standard DES sampling. So for three days, Adrien heard 6 beeps a day and jotted down his experience of the moment right before the beep. A 1-hour interview followed within 24 hours of the daily beeps being collected. Once we switched to dDES, we had 2 more days of sampling. This, again, involved 6 beeps a day. After each beep, Adrien jotted down his experience of the two moments before the beep, as well as how these moments unfolded in time. An interview followed within 24 hours of the 6th beep. This interview lasted around 1.5 hours.

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A salient feature of Adrien's temporal experience was of possible interchange between consciousness and subconscious processes. Elements would appear in consciousness, but not like they came from nowhere. Elements would leave consciousness, but seemed like they could be returned to, perhaps like they were being processed in parallel.

An example of an element appearing, seemingly not out of nowhere, is with Sample 4.1. In Moment 1, Adrien lost his balance and was falling. In Moment 2, Adrien experienced landing on his right foot and finding balance again. There was a feeling of relief as part of this. However, the finding balance aspect of experience didn't feel like it appeared out of nowhere. To Adrien, it felt like it was increasing prior to Moment 2, but not in awareness. It only entered awareness when the experience of falling vanished.

dDES, of course, can't directly investigate subconscious processing. In fact, it can't even assume what 'processing' is. This may be a 'mentalism' with no direct corollary in actual lived experience. However, we can draw inferences based on samples. Adrien didn't experience the 'finding balance' element before it entered his direct consciousness. However, once it entered, it didn't seem strictly new. It seemed as if it had started prior.

Another salient feature of Adrien's experience was what he called "smooth jumps." Some transitions between M1 and M2 felt impermanent. It felt like M1 experience could be returned to—possibly like it was still being processed, in parallel, outside of direct awareness (again we're agnostic about what exactly this 'processing' is). In contrast, some transitions felt permanent.

An example of a smooth jump is with Sample 4.2. In M1, Adrien was having an imaginary conversation with his PhD supervisor. In M2, Adrien was reading. The transition from M1 to M2 was sudden. However, the jump felt "smooth." It didn't feel like the M1 conversation element had definitively ended. It felt like he could jump back into it and nothing would be lost. Adrien described it "like happening in parallel." Here's another example of a smooth jump, this time a full dDES sample:

Adrien Sample 4.4

<u>Moment 1</u>

Adrien is smelling his fart. This experience consists of inhaling and feeling the smell in his nose.

Adrien also has a thought along with this. This has three components. That the fart a) isn't that bad, b) smells different than usual, c) that it's funny/interesting that it smells different. Adrien described this thought aspect as "sketchy and unstructured." There aren't words or images to it. It's separate from the smelling aspect. <u>Coding</u>: Sensory awareness, Unsymbolized(?) thinking

<u>Moment 2</u>

Adrien is skimming text of a thesis proposal on his computer. He's trying to catch something to give him a clue as to what the proposal is about. At this moment, he isn't focusing on any particular words. There's a visual part to this and a volitional part (trying to catch), although Adrien wouldn't separate these components. <u>Coding</u>: Cognitive doing

<u>Temporal</u>

The smelling and the thought may have been instantaneous, or the smelling was maybe right before the thought. In any case, they were close together. The thought didn't grow in intensity. The smelling element decreased over the moment and then faded away altogether.

Adrien stopped inhaling. As soon as he stopped, he jumped back to the skimming. This was direct but not brusque. Adrien kept using the phrase "jump back." He had already been skimming and could get back to it easily. He described it as a "controlled jump." <u>Coding</u>: Switching, Disappearing / fade out (sensory awareness)

Fig. 23
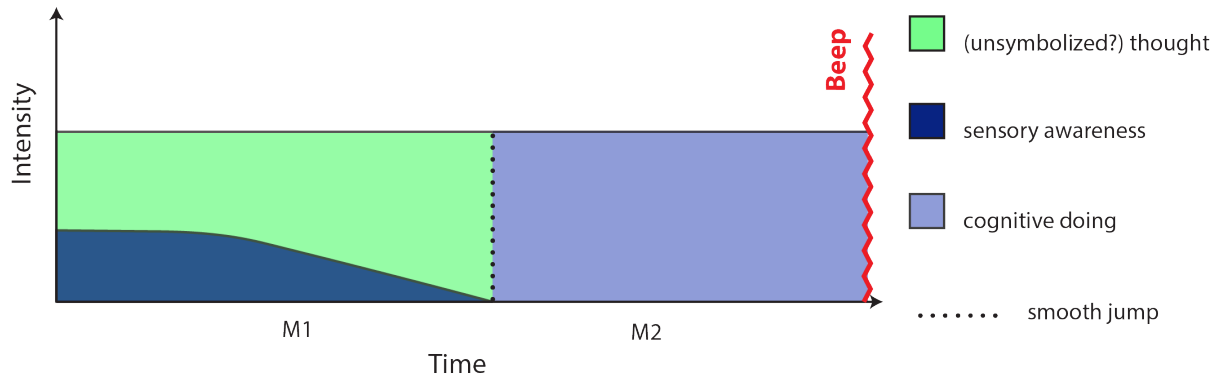
In our first example, we saw a smooth jump *away* from an experience. In this second example, we see a smooth jump *back* to an experience that had previously been conscious. Adrien had previously been reading. After the fart-smelling aspect of experience, he could jump back to this reading aspect. He jumped from one aspect to the other all at once, but it still didn't seem brusque. This is in contrast to some samples where the transition from one moment to the next was much harsher. For example:

Sample 5.4

<u>Moment 1</u>

Adrien is wondering: how did the oven glove get folded in four? He's looking at the glove, but this isn't so much in his awareness. His awareness is mostly occupied with the thought. There aren't images or words to it. It's brief. <u>Coding</u>: Unsymbolized(?) thinking

<u>Moment 2</u>

Adrien is reaching for the oven glove. This involves feeling his body and trajectory. The goal of reaching for the glove is also part of his experience, and not separate from the physical component.

Also in his experience is thinking about where to put the hot dish. He described it as not a big thought and "not very complex." Seeing is a part of this thought—looking at the table. <u>Coding</u>: Doing, sensory thought

<u>Temporal</u>

Moment 1 was much shorter than Moment 2. Adrien called Moment 2 "at least three times longer than the farthest moment."

Adrien started with the thought about the glove. The movement interrupted this glove thought. It felt like there was no intention or possibility to go back to the glove thought. Adrien wasn't sure how the dish thought came in. As a transition, he said he must have moved his eyes to the table, but didn't know how it happened. <u>Coding</u>: Interruption, Emerging / unspecified (sensory thought)

Fig. 24
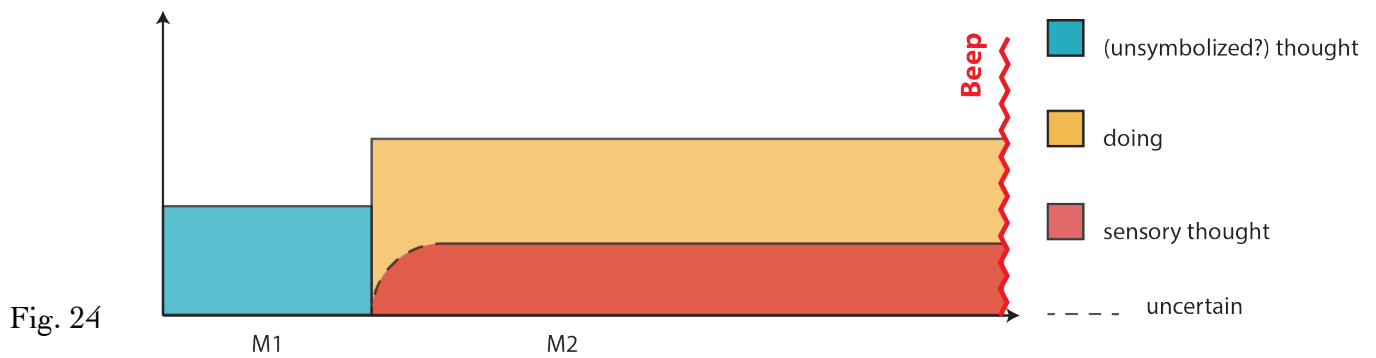
We see that this is the opposite of what Adrien calls a "smooth jump." It's abrupt and brusque. It feels like there's no possibility to go back to the glove thought. The M2 experience completely supplanted the M1 experience.

Adrien summed up concerning his experience, "I feel like some thoughts I can keep without having them in experience. And some I don't. And when I leave them, they're left to be forgotten." DES and dDES are wary of any generalizations that participants make about their own experience. However, this generalization was backed up by our sampling as well. Thoughts like Adrien's imaginary conversation with his PhD supervisor, he could keep without having them in direct experience. Thoughts like the glove thought he couldn't keep. They're "left to be forgotten."

It's quite possible that some thought processes really do continue, outside of direct awareness, like actors moving around a stage even when the spotlight shifts to someone else. dDES allows us to speculate on the interplay between the conscious and unconscious. Indeed, dDES research could be useful for topics like the neural correlates of consciousness. However, any inferences about unconscious processes should be marked as speculations. dDES can only directly examine what's in direct experience.

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However, the boundary between direct experience and subconscious experience may be hard to define. We saw in Sample 5.6 that the word "enterrer" [bury] lingered and pushed out "parasites" of thought, creating a vacuum. These parasites of thought were faint, unclear thoughts, hovering just on the verge of awareness. Adrien estimated them as taking up about 5% of his total thought. His inner reading pushed these thoughts out of awareness.

The presence of these parasites of thought raises questions. Might they be present more often but not apprehended? Could they only be apprehended once something happens to them—once they get pushed out, for instance?

This recalls Hurlburt and Schwitzgebel's discussion of "rich experience" (2007). Some consciousness scientists argue that experience is rich. Our direct attention may be limited

to one or a few components at a time. But our overall consciousness has many more components in its periphery, "sensations like that of the pressure of the chair against one's back, the noise of a distant jackhammer, background feelings of anxiety, slight feelings of hunger, etc." (p. 74). So even while our direct attention may be limited, our consciousness at any one time contains a whole spectrum of sensations, feelings, thoughts, etc.

Hurlburt notes that this may or may not be the case. DES doesn't pursue the excessively faint and hard to detect (arguing that this is what doomed the introspectionists at the turn of the 20ᵗʰ century). Some aspects of awareness are clear. When aspects are faint or unclear, they may be misreported. DES seeks to avoid letting these aspects bog down discussion. These faint aspects are like little flecks on a microscope slide that could be organisms or could just be specks of dirt. Spending too long arguing about their nature could distract us from the much more salient things that we can observe.

Nonetheless, Hurlburt (2007) notes that most subjects are quite clear that experience at the moment of the beep is of just one or a few things. DES is capable of discerning when experience is multiple—such as with bulimic individuals who have up to dozens of simultaneous elements. But with most individuals, this is not the case. Hurlburt thinks it's possible that DES may miss one or a few elements in consciousness. But it's unlikely that our consciousness always contains all possible aspects of sensation—for example, constant sensation of our left big toe.

Now to return to Adrien and his 'parasites' of thought. Do they represent rich experience? Might he have parasites of thought at other moments, just unreported? It's impossible to say for now. It's merely interesting to note the possibility. In Sample 5.6 at least, they were a salient aspect of experience. When the lingering word pushed them out of experience, their absence was noted. This absence resulted in an experience of silence. This wasn't just the absence of sound. The silence had a quality that made it experientially different from typical experience without sound.

We can compare this to a later sample, T1.2.[28] At this moment, two elements take up roughly 15% of Adrien' experience. One is of seeing a clock. The other element is "thought noise"—small chatter of thoughts, of which Adrien was unaware of any content. And the other 85% of experience? Nothingness. This isn't a thought with the content of nothingness, or an "empty thought" as Adrien had described earlier. It's simply "nothing." Roughly 85% of experience is of nothing. Does this make sense? Why would nothingness take up a chunk of experience? Wouldn't we just take Adrien's entire experience to be the 15% that was directly experienced at the moment? But to Adrien, nothingness did indeed take up a chunk of experience. *Nothingness was directly experienced*. Think of his experience like a donut with a giant hole in the center. It wouldn't make sense to talk about the donut

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[28] This sample is from Adrien' experience of the Libet task, as discussed in chapter 15.

without talking about the hole. How this is cognitively/neurally possible is another question, and one that dDES can't answer.

So we've seen that for Adrien, silence can be directly experienced, and nothingness can be directly experienced. We've also seen that thoughts can seem ongoing without being directly experienced. These findings may clash with some presuppositions about what can and cannot be directly experienced. Do they clash with yours? If you find yourself skeptical here, it's worth questioning your presuppositions about experience. Where do they come from? From your own experience? What makes you think these presuppositions are valid? I say this since Adrien's samples did indeed go against my own presuppositions about experience. For the elements that surprised me, I pursued multiple lines of questioning, to make sure I was understanding them correctly and that Adrien wasn't misattributing them. I became more confident. Experience of absence is apparently different from absence of experience. We'll address further questions related to absence and presence in the discussion, in Chapter 14.

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Let's turn to other aspects of Adrien's temporal experience. Adrien had certain temporal dynamics that are fairly common—Emerging, Disappearing, Overlapping—as seen in the preceding chapter. He also had some less common temporal dynamics. He had two examples of a Cross-fade—where an element from M1 faded out as an element from M2 faded in. We saw this in the sample in the introduction, and with the transcript excerpt. Adrien also had the one example of an L-Cut that I observed. M1 experience faded out gradually while M2 experience entered abruptly, all at once. They partially overlapped. Adrien also had an instance of Merging, where two elements merged into a single element. However, this sample (5.3) was difficult to parse, so I'm not confident of 'Merging' as a generalizable code.

So as we've seen, Adrien has quite a few idiographic characteristics of experience. They are specific to him and not found with any of the other participants here. This includes the codes Merging and L-Cut, and his "smooth jumps." The smooth jumps are his most salient feature of temporal experience, since they occurred across multiple samples, and weren't present with any other participants. Adrien may be unique in this regard (although it's certainly too early to say).

From the participants here, Adrien was also unique in his experience of entire sentences contained in an instant. We saw this in Sample 5.5 in the introduction. Adrien heard a mental echo of the sentence "do you know 'herbse' is?" The whole sentence was contained at every instant, extending over time. Adrien used the metaphor "like looking at the sun, and the sun stays in your vision after." In sample 5.6, too, the word "enterrer" was

contained in its entirety at every instant and lingered over time. These examples are comparable to a sample we saw from Melanie (Hurlburt & Schwitzgebel, 2007, p. 212). Melanie was innerly hearing repetitions of the phrase "nice long time." The repetitions came extremely rapidly one after the other. But the phrase didn't feel sped up. It didn't seem faster than normal speaking. Hurlburt concluded that "time is a pretty screwy thing in the sense that it's not at all uncommon for people to report things that seem to violate the laws of temporal sequence." (p. 212). Some of Adrien's samples, as well, violate the 'laws' of temporal sequence. Of course, these supposed laws may be nothing more than our presuppositions, which no longer apply to inner experience.

<p align="center">❈❈❈</p>

Let's come now to a fundamental question of dDES. What exactly is a moment? This question can be broken into corollary questions. How long is a moment? Are they always the same length? Is a moment something clearly defined or is it arbitrary?

In terms of the first two questions, moments aren't always of the same length. At least experientially. We can't yet make any claims about how the length of an experiential moment corresponds to physical duration in seconds. We can only infer, using clues like physical activity that's ongoing at the time. With Sample 4.2 for instance, M1 felt much shorter than M2. To Adrien, M2 lasted a bit less than a second. M1 felt like half or one-third of that. This doesn't necessarily mean that if we used our Phenomotron3000 to tap into Adrien' brain, project his experience through a loudspeaker, and time it with a stopwatch, that we would measure these same durations. It *might be* that, in this case, M1 was actually *the same length or longer* than M2. We can't know. Experiential time may be quite different from our Phenomotron3000 time. But at least experientially, moments can be quite variable in length. With Sample 5.4 as well, M2 experience was "at least three times longer" than M1.

Moments of experience can be much longer than our typical estimate of 1-2 seconds. With sample T2.2, the moment before the beep lasted 5-10 seconds by Adrien' estimate. Hurlburt and Krumm (2020[29]) have observed that sometimes experiential units can be quite long for people, even extending up to minutes. Adrien couldn't break his moment into two separate moments. It was impossible to further subdivide. This shows that the idea of moments can be arbitrary. Sometimes moments are easily divided—for example, the abrupt transition in Sample 5.4 when Adrien reaches for an oven glove. But sometimes separate moments are arbitrary. We already saw that with sample 5.6, Moment 1 could have theoretically been divided into two more moments—one with parasites of thought, and one where the word "enterrer" pushes out these parasites of thought. In conclusion, our experience can be quite variable. Sometimes it can divide neatly into moments. At

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[29] A Youtube series of DES expositional interviews, quite useful for anyone interested in gaining familiarity with the method.

other times, these divisions are arbitrary. In chapter 14, we'll look at a body of research claiming that we segregate consciousness into discrete moments of around 2-3 seconds (Pöppel, 1989, 1997; Wittman, 2015; Montemayor & Wittman, 2014; Kent & Wittmann, 2021). dDES research shows that, at the very least, there are a wealth of exceptions to this.

We saw that experiential moment can be quite long. They can also be very short. In Sample T2.1, Adrien described M1 as "very very very tiny," and maybe "a millisecond." In Sample 4.5, between M1 and M2, Adrien had another aspect of experience so short that he wouldn't even group it as a separate moment.

Sample 4.5

Moment 1
Adrien is experiencing singing/whispering along to a song, "Ta da dadada Ta dada dada." It's mostly rhythmic and not so much about melody.

He's looking at his smartphone homepage but this isn't so much in his awareness.

Adrien also has the thought that he still hasn't gotten a beep. This thought is complex, compared to the next moment. It involves various components, like that he's supposed to have 6 beeps, he only has 5, it's half past 8 and he's still missing a beep. All these components are simultaneous, as part of the same thought. Coding: Singing, perceptual awareness, unsymbolized thinking

Moment 2
Adrien is singing/whispering "Ta da dadada Ta dada dada." This is the same as in moment 1. The beep comes at or near the end.

Again, he's looking at his smartphone, but it isn't so present in awareness.

Adrien is also thinking: Should I play chess? It isn't worded or imaged. It's a "less complex" thought than in Moment 1. Coding: Singing, perceptual awareness, unsymbolized thinking

Temporal
There was actually an intermediary thought between the moments. It had the content "Why are you on your smartphone?" It was only very slightly experienced. It caused the Moment 2 thought.

The Moment 1 thought was quite stable (it might have diminished at the end, but Adrien wasn't sure). Adrien described all these moments as on the same line—just the smartphone part dipped down until it was nearly out of experience. But the general experience for Moment 1 and Moment 2 was the same, just the content was different.

Also, the thoughts were structured by the song phrase. The intermediary thought came at the end of one song phrase. The second thought came with the start of the second song phrase. Coding: Grace note

Fig. 25
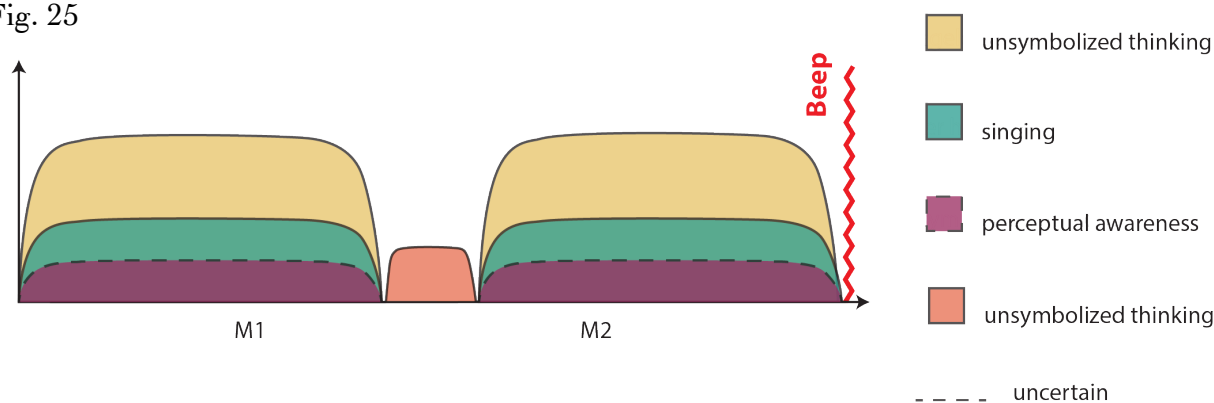
This transition could be coded as a Grace note. The "Why are you on your smartphone?" thought was so slight in awareness that it didn't make sense to Adrien to call it a separate moment. It did, however, spur on the M2 experience.

Another interesting aspect of this sample is that rhythm structures experience. M1 experience falls within one rhythmic phrase. M2 falls within the next phrase. This could just be a coincidence—experiential moments happen to start and end with rhythmic phrases. Or the rhythms we listen to could sometimes structure the rhythms of our thoughts. Adrien, at least, switched from one thought to the next when the rhythmic phrase ended.

Outside stimuli could structure our thoughts. Our thoughts could also structure the perception outside stimuli. Hurlburt notes that we may shuffle our experience to place a DES beep at the end of a sentence of inner speaking, when in reality it came in the middle (Hurlburt & Schwitzgebel, 2007, p. 83). So let's say in reality the beep comes as you're innerly speaking: "I need to buy more ki[BEEP]wis." You may experience this as "I need to buy more kiwis" [BEEP]. This may not be a problem of recalling experience after the fact. We may actually originally perceive the beep to come at the end. Psycholinguistic studies give weight to this speculation. Participants perceive clicks closer towards natural sentence boundaries than they actually occurred (Fodor & Bever, 1965). So our inner world could structure the outer world and vice versa.

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To sum up, we saw that Adrien had a good amount of unsymbolized thinking and sensory awareness in his experience (comparable to the averages from Heavey & Hurlburt, 2008). He also had above average amounts of cognitive doing and experience that was "rough," "unclear," or "sketchy." And he had above average amounts of experience with disconnected modality—imageless seeing, for instance.

In terms of temporal dynamics, Adrien had some transitions that were less common. A grace note of experience flitting between two longer moments. Cross-fading of an experiential element entering, while another recedes. Experience where two elements merge into

one. Adrien had other ideographic temporal aspects, like an entire sentence contained at every instant, extending over time, like the afterburn of sun in your vision.

The most salient feature of Adrien's experience was his "smooth jumps." No other participant had these. Some experience felt like it could be returned to. It perhaps continued in parallel, even though not directly experienced. Other experience felt like once it was gone, it was gone for good.

We saw that this has implications for understanding the interplay between the conscious and the subconscious or unconscious. Might some aspects of experience continue to be processed even when they're not in direct experience? DES can't directly say anything about this processing. But I would hypothesize that yes, for some people, aspects of experience can continue to be processed once they leave awareness. Perhaps in the future, we'll be able to identify neural substrates for such processes. dDES research could, in this way, inform discussions of the neural correlates of consciousness. But even aside from this question of neural firing, we're left with intriguing finding about the variability of experience. No other participants had these "smooth jumps." We'll see that every participant had some features of consciousness lacking from the rest of the pack. Even features as fundamental as how we transition from one experiential moment to the next, can in reality be variable.

10. Max

Momentary experience

Max is an Austrian 28-year-old master's student in both psychology and physics. He's also a guitarist in a psychedelic rock band. Music is an important part of his life and showed up in quite a few samples. He was a careful observer of his own experience and willing to adapt his observations to the method. He remained skeptical, questioning if aspects he reported were really in his direct awareness.

The DES procedure was somewhat different with Max than with other participants. Max carried out DES for 6 days prior to the official start of the samples given here. This was not only for Max's training but for my training. I was fairly new to the method and needed practice. So Max's 7ᵗʰ day of training is where we officially start and is here called Day 1.

We can compare Heavey and Hurlburt's (2008) findings of the five frequent phenomena of experience to Max's experience.

Frequent Phenomena	**Max** (%)	**Average** (%)
Sensory Awareness	49	22
Feelings	14	26
Images	14	34
Unsymbolized thinking	11	22
Inner Speaking	3	26

We see that Max had a somewhat below-average amount of feelings, images, and unsymbolized thinking. He also had a far below average degree of inner speaking, found in only one of his samples. However, he did have a comparatively high degree of inner hearing at 11% of his experience. Heavey and Hurlburt did not find inner hearing as a frequent phenomenon of experience. For the difference between inner speaking and inner hearing, think of the difference between speaking into a tape recorder versus hearing it played back. Inner hearing is akin to hearing it played back. It's of listening to a 'voice in your head' without the impression that you're forming and speaking the words.

For most categories of frequent phenomena, Max was below the average. But Max had a far above average amount of sensory awareness. This phenomenon was present for 49% of his samples—compared to Heavey and Hurlburt's finding of a 22% average. Max had the most sensory awareness of all 8 participants sampled here. The average for others besides Max was 18%.

Sensory awareness, again, refers to noticing specific sensory aspects of the environment. For example, the way light shines off the fuzzy brown skin of a kiwi. Note that for a phenomenon to earn this code, it must involve specific attention to sensory aspects. For example, if you just happen to be looking at a kiwi, but you're not attuned to any sensory aspect of it, this wouldn't count. It could instead be coded as perceptual awareness.

So let's take an example from Max—Sample 1.1. Max feels the cold metal of a sewing needle on his thumb and pointer fingers. This is sensory awareness because he's specifically feeling the cold metal. If he happened to be sewing and holding the needle but instead was thinking about a text his ex sent, then this wouldn't count. Let's look at another sample, with a more complex instance of sensory awareness.

Sample 1.6
Max feels drops of rain on his hair. He fees the warm wetness.
Max also has a mental image and sense of the air around being steamy. The image is of warm red ground, cold blue rain, and white steam. The perspective is as if Max is in the scene.
There is an impression of steaminess that's more than just the image.
Max also feels pressure on his bladder, from having to pee. <u>Coding</u>: Sensory awareness, image (with sensory awareness), impression, perceptual awareness, multiple awareness

Feeling the warm wetness of raindrops on his hair is sensory awareness. Max also has another instance of sensory awareness, regarding the image—the warm red ground, cold blue rain, and white steam. Not every mental image counts as sensory awareness. But if the participant is focused on specific sensory aspects of an image, it can count. For example, just a mental image of a kiwi in a bowl of fruit wouldn't be sensory awareness. But an image of the way light glistens off of the moist green flesh of a cut open kiwi—that would be sensory awareness. Since Max's mental image involves specific sensory aspects of the ground, rain, and steam, we can count it as including sensory awareness.

The impression of steaminess is another matter. Perhaps it could best be coded as an 'impression.' And there are some other cases where this coding is useful. But keep in mind that coding merely presents a model, and doesn't seek to fully encapsulate the realities of experience.

Codes can mix. In Sample 2.2, a thinking component and a sensory component are mixed. Max is tasting tomato sauce and remnants of mouthwash in his mouth. He thinks about how it tastes weird. In the moment before the beep, the thought and the taste are combined. This could be called a sensory though

We previously discussed the code 'cognitive doing.' This applies to mental experience that's part of an active ongoing activity. Even Max's cognitive doing could involve sensory aspects. For example, in Sample 1.4 Max is trying to think of a counterargument to his friend Karin's complaint about embodied approaches to the mind. This counterargument element involves navigating a maze, trying out different corridors. This isn't just metaphorical. It physically feels like Max is navigating a maze in his head. So we see that sensory

aspects could be integrated into other aspects of Max's experience, including more cognitive, thinky ones.

Another salient feature of Max's experience, as mentioned, was that it frequently involved music. Max had a good deal of samples with musical content—hearing the bass-line of a song, playing guitar and listening to the decay of a note etc. It can be hard to generalize content from samples. Frequency of certain themes could be influenced by the times Max chose to sample. Participants can choose when in the day they want to receive their DES beeps. Perhaps he chose times when he was relaxed and playing/listening to music, rather than when he was working or studying. Still, I think it's fair to say that listening and playing music is an important part of Max's experience.

Temporal experience

We switched to dDES after 7 days of DES. dDES sampling continued for 4 more days. A number of codes for temporal dynamics emerged in Max's experience—Emerging, Disappearing, Cross-fade, Transformation, Switch, Buffer. However, the most salient dynamic was Overlapping. This was present for 47% of his samples. This is far above the average for our other participants, at 21% of samples.[30] Overlapping, again, is when an element of experience continues across two moments. Other elements can vary across these moments, but the overlapping element stays in awareness. For example, if in both M1 and M2 you're tasting the sourness of kiwi, this counts as Overlapping. Other experience may vary across these moments—say in M1 you're thinking about your heating bill and in M2 you're thinking about visiting a childhood friend. Still, the kiwi element of experience remains for both moments. It may stay constant, grow, diminish, or otherwise alter—and we can code for these subcategories. But as long as it stays present, we can call it Overlapping.

About 60% of Max's Overlapping experiences were of sensory awareness or perceptual awareness. So standard DES ties in to dDES. We already saw that Max had frequent sensory awareness and other sensory elements. These phenomena often carried through from M1 to M2. So Max noticing sensory aspects of his environment extended over time, across moments. These elements may have lasted much longer than two moments. dDES can't say for now (although perhaps another method could in the future). But we see that Max's sensory awareness at least has some extension in time, remaining present even as other elements come and go. Here's an example:

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[30] Overlapping may be higher for other participants if we count 'rich experience'—the elements of experience that are faint and that DES doesn't always aim to report. Still, Max had the highest degree of Overlapping concerning the main elements of his experience.

Sample 2.2

<u>Moment 1</u>

Max is tasting tomato sauce and mint (from his mouthwash) and how they clash. This isn't just purely sensory but also involves a thought component—about how it's strange that he tastes both, but it makes sense since he used mouthwash earlier, but it's still weird. Max wasn't sure which exact part of this thought component was present at this moment. <u>Coding</u>: Sensory thought

<u>Moment 2</u>

The tasting tomato sauce and mint is still ongoing.

Also present is the sensation of chewing. It's especially noticeable on the left side of Max's mouth since he's using that side to chew, having just gotten his wisdom teeth taken out on the right side. <u>Coding</u>: Sensory thought, sensory awareness

<u>Temporal</u>

The tomato mint element was present for both moments, but it altered and changed as the thinking component changed.

The chewing aspect entered and this defined the separation into moment 2. Max was unsure of exactly how it entered—suddenly or not. Max said the division into two moments was hard. <u>Coding</u>: Overlapping / altering (sensory thought), Emerging (sensory awareness)
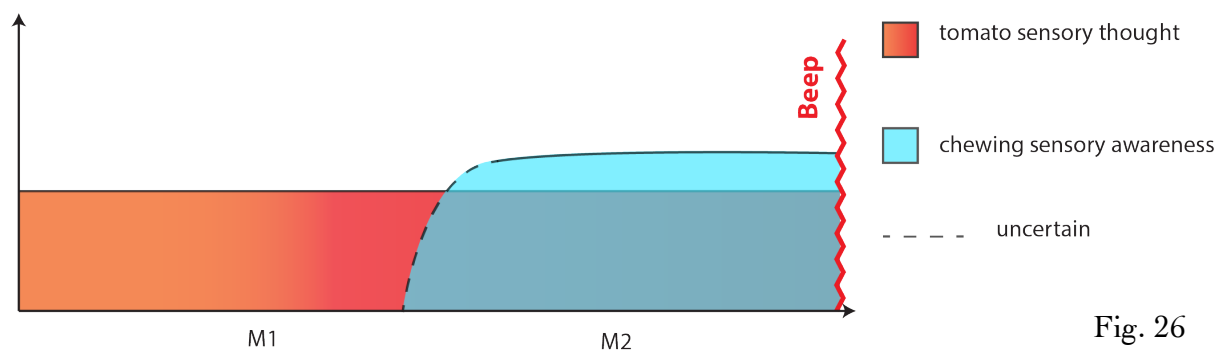
Fig. 26

So we have what we could call a sensory thought overlap across two moments. Tasting the tomato and mint WAS present for both M1 and M2. It altered somewhat as the thought altered, so we could subcategorize it as Overlapping / altering. Also of note is that it was hard for Max to subdivide experience into two moments. He divided it when the chewing element entered. Still, this seemed somewhat arbitrary for him. More than most participants, Max found it difficult to separate experience into isolated moments. Let's look at another sample that demonstrates both overlapping and difficulty dividing into separate moments. In this sample, not one but two elements of experience overlap across two moments.

Sample 2.3

<u>Moment 1</u>
Max is saying "eeehm." He experiences this as feeling the vibrations of air out of his mouth.

Max also has a mental image of his closet and is searching it for a piece of clothing. At this moment, the view is from a high angle looking down on the closet. This experience is mostly visual, although Max thought there was some thinky/cognitive part as well. <u>Coding</u>: Sensory awareness, image (or imaged thought)

<u>Moment 2</u>
Max is still saying "eeehm." He experiences this as feeling the vibrations of air out of his mouth.

The mental image zooms in, to the top right part of the closet. Max defined this as a separate moment because it's more about the cognitive aspect of being pretty sure the piece of clothing is there. This aspect isn't separate from the image <u>Coding</u>: Sensory awareness, image (or imaged thought)

<u>Temporal</u>
The "eeehm" element of experience stayed similar for both moments.

The change of image is how Max qualifies the change of moment. It quickly zoomed in, during the transition from Moment 1 to Moment 2. It wasn't zooming the whole time, just during the transition. <u>Coding</u>: Overlapping, Overlapping / altering
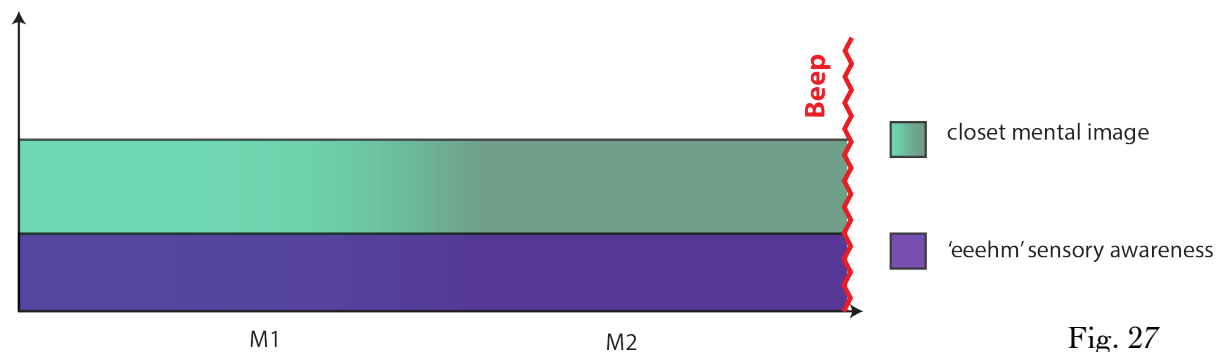

Fig. 27

So we have two experiential elements that overlap across two moments. The first is speaking "eeehm." Just speaking, by itself, wouldn't count as sensory awareness. But Max is feeling the vibrations of air coming out of his mouth. This speaking element stays relatively constant across both moments.

The other overlapping element is Max's mental image of his closet (although perhaps since there may have been a cognitive component, this is best categorized as an 'imaged thought'). This element did change somewhat across the two moments. The image zoomed in. Perhaps this could also be coded as a Transformation. Boundaries between codes aren't always so clear. Still, since the change wasn't so drastic, Overlapping / altering is the best fit.

We see, again, that the separation between Moment 1 and Moment 2 isn't so neat. Max marks this separation by where the image zooms in, with this encompassing certainty

about where the piece of clothing is. But this separation into two moments seems more like a conscious justification and less like a natural separation in the moments themselves.

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Max also had quite a few samples that he couldn't separate into two moments at all—3/17 dDES samples, so 18% of his samples. This may have, at times, been a memory issue or may have been due to the nature of experience itself. For example, let's look at Sample 3.2. This was supposed to be of two moments before the beep, but Max had no idea how it was arranged temporally.

> **Sample 3.2**
> Max is lying on his bed, thinking about a song for his band, wondering if it's good or bad. He's innerly speaking: is it good or is it bad? It's in his voice, normal tone and speed, maybe a bit higher pitched.
> He also has a feeling of insecurity. It feels like it's present everywhere, even outside his body. This description is between metaphorical and literal.
> He's also experiencing the fresh air through the window. And the separate but related experience of his feet being cold. <u>Coding</u>: Inner speaking, feeling, sensory awareness (x2)

Again, Max had no idea how this was arranged temporally. He described the experience as "stretched out." Perhaps this made it difficult to remember. Or perhaps neat sequencing of events wasn't part of the experience to begin with.

Philosophers and consciousness scientists debate whether consciousness flows like a stream or is somehow disjointed. Dainton (2000, 2010) argues that it flows without breaks. Strawson, on the other hand, writes that consciousness "is always shooting off, fuzzing, shorting out, spurting and stalling" (1997, p. 421).

But as we've seen, the temporal dynamics of consciousness are different for different people. Out of our participants, Max had by far the highest degree of experience that carried across both moments. He also often had difficulty separating experience into separate moments.

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Max's experience didn't always contain these overlapping elements however. In fact, in one sample, we have the opposite. There's a gap between M1 and M2 with possibly no experience.

> **Day 4 Sample 1**
> <u>Moment 1</u>
> Max is sliding his hand up his guitar fretboard. He's experiencing the motion of this. <u>Coding</u>: Sensory awareness

<u>Moment 2</u>
Max is experiencing the decay of the guitar note he has just played. <u>Coding</u>: Sensory awareness

<u>Temporal</u>
The sliding was in his experience. And the decay of the note was in his experience. But the actual note was not in his experience. There may have also been a visual experience of seeing his surroundings throughout both moments, but Max was unsure.

M1 had a "fast fade out," as Max put it. M2 had an abrupt onset. <u>Coding</u>: Buffer
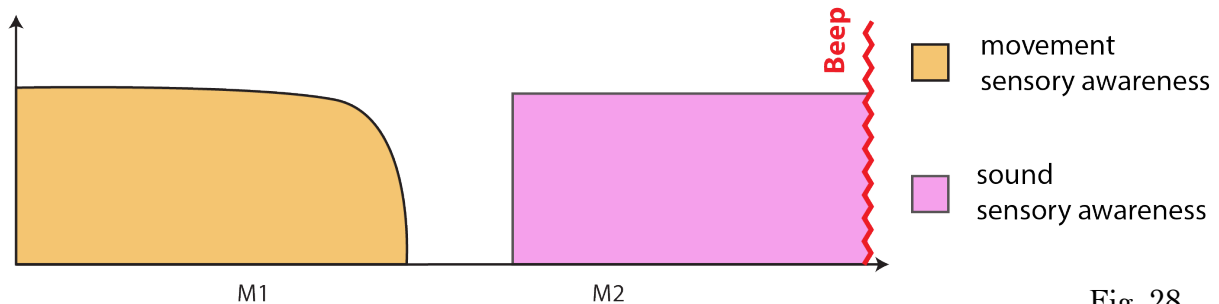

Fig. 28

M1 was of Max sliding his hand up his guitar. M2 was of a decaying note. But the actual playing of the note wasn't in experience. dDES and DES don't have the power to say that nothing was in experience. There's always the possibility of faint experience (in this case, possible visual experience), or unremembered experience. This is to avoid overstating the method's reach. But at least gaps with no experience are a very real possibility. This goes against the 'continuity thesis' in the philosophy of temporal consciousness. Proponents of the continuity thesis hold that there are no gaps in our consciousness (Dainton, 2000). There are no blocks without any experience. Data from Max and others show that there isn't enough backing to the continuity thesis to use it as an a priori justification for model building.

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I want to mention one other interesting sample involving temporality. This sample is from Max's 6-day practice period, which I didn't otherwise include in this analysis, since I was also building up my skill as a DES researcher. For this sample, Max was under the influence of psilocybin, a hallucinogenic substance. Max has an ongoing interested in psychedelics, especially in their cognitive and neurological effects. His interest led him to want to conduct DES samples while under their influence. While he had read a good deal of research on psychedelics, this was one of his earliest experiences ingesting them. He wasn't encouraged to do so as part of this research.

Sample 11

Max is listening to "Brain Damage" by Pink Floyd while under the influence of psilocybin mushrooms.

At the moment of the beep, he's seeing a nebular galaxy. It's red against a blue background which extends across his entire visual field. The galaxy feels big, like the size of an actual galaxy. It's rotating at the speed of the guitar rotary effect from the song.

Rays of light are shooting out of the galaxy, in sync with backup vocal voices popping into the song. These two rays wrap around each other. One of the voices is lower and one is higher and each seems connected to a ray.

These rays of light are the main focus of Max's experience at this moment (although the rotating galaxy is in the background). <u>Coding</u>: Imaged hearing with sensory awareness(?)

Here we have a complex instance of sensory awareness—a nebular galaxy and rays of light wrapping around each other. From the perspective of temporality, it's interesting that the galaxy is rotating at the same speed as the guitar from the song. And rays of light are shooting out of the galaxy, in sync with backup voices popping into the song. Visuals and music are linked. And their progression over time is linked.

An exploration of the effects of psychedelic drugs on consciousness and temporal consciousness would be fascinating. For now, let me offer some very tentative speculations based on this sample and a few DES samples of my own consciousness under the effect of psilocybin. Psychedelics result in cross modal connectivity. Different sensory modalities (for example auditory and visual) become intertwined. From my own samples, conceptual thought and images were intertwined in a way that rendered them indistinguishable. This speculation perhaps isn't so deep. Trip reports commonly mention synesthetic aspects. And the neuroscience of psychedelics indeed shows connectivity between regions that aren't normally connected (Roseman et al., 2014). But it would be interesting for further research to see if the phenomenology reflects this. Due to the potential of psychedelics in therapeutic treatments (see Fuentes et al., 2020, for instance), an exploration of inner experience under the effect of psychedelics would be fruitful.

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To sum up findings, Max had a high degree of sensory awareness. He always had a high degree of overlapping experience that carried across M1 and M2. We see that results from standard DES have implications for dDES and vice versa. Max was frequently noticing sensory aspects of his environment and body. And these aspects lasted over time, at least across two moments, and possibly longer. It's also interesting to note that, for quite a few samples, Max couldn't easily separate out two moments. Perhaps this had something to do with memory. Or perhaps Max's experience itself was different for these moments—at one point, Max described his experience as "stretched out."

Max also had temporal dynamics that could be coded as Emerging, Disappearing, Cross-fade, Transformation, Switch, and Buffer. This last code involves a gap between two moments with no experience (or perhaps slight experience). We saw that this code goes against philosophical assumptions like the continuity hypothesis—that our temporal experience is unbroken and without gaps. Max's consciousness, indeed, often was unbroken and involved elements stretching over time. However, this wasn't always the case, and his consciousness could, at other times, be disjointed.

11. Nora

Momentary experience

Nora is an Austrian 24-year-old student who has recently finished a degree in economics and is about to start a program in social design. She likes staying active—walking in nature, skiing, and practicing capoeira. She was quite skilled at DES from the start and had little trouble locating the moment of the beep. She was willing to question her reported experience and learn how to apprehend in greater detail. Let's look at the five frequent phenomena (Heavey & Hurlburt, 2008) as they pertain to Nora's experience.

Frequent Phenomena	Nora (%)	Average (%)
Feelings	49	26
Unsymbolized thinking	23	22
Sensory awareness	22	22
Images	15	34
Inner Speaking	8	26

As we see, Nora has a degree of unsymbolized thinking and sensory awareness comparable to the average from 30 individuals. She has a somewhat below-average proportion of images. And her proportion of inner speaking is quite below average.

By far the most predominant aspect of Nora's experience is feelings. She had the experience of feelings in 49% of her samples. This is about twice the average found by Heavey and Hurlburt.[31] The average for other participants sampled in this thesis was 18%.

The code 'feelings' designates emotional experience. Recall our example of the feeling of really hating kiwis. Let's look at one of Nora's samples involving two separate feelings at the same time.

> **Sample 2.1**
> Nora is writing in her diary. At the moment of the beep, she has the feeling of being tired and not wanting to write. This doesn't have a bodily location.
> At the same time, she's sighing and feeling some relief from the sigh. This is a separate feeling from the first one. <u>Coding</u>: Feeling(x2)

Here Nora has two separate, simultaneous feelings—the tired/not wanting to write feeling, and the relief feeling. Nora's samples sometimes involved one feeling at a time and sometimes more. For example, in Sample 2.4 Nora was asking a waiter what the difference

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[31] It may be a stereotype that women have more feelings then men. But Heavey and Hurlburt found that men had a higher proportion of feelings as part of their inner experience (31% for men and 23% for women).

was between a falafel plate and a falafel bowl. She was simultaneously feeling confusion about the difference, and pressure from having to order. These were separate feelings.

Heavey and colleagues (2017) also studied the phenomena of mixed feelings and blended feelings. Sometimes multiple feelings could be blended together, to create a new feeling with multiple components (blended feelings). Sometimes multiple feelings could exist simultaneously and separately (mixed feelings). An example of a mixed feeling similar to Nora's is of Karen leaving work, feeling both happy and bummed at the same time—happy about leaving, and bummed about having to come back. These are two separate feelings, but she has the sense of the happy feeling being lessened by the bummed feeling (p. 107).

In the two samples of Nora's above, she did not experience her feelings with a bodily location. Sometimes her feelings did have a location (e.g. a 'pit' feeling, or an excited feeling in her stomach) and sometimes not. To compare to micro-phenomenology, one study (Vásquez-Rosati, 2017) found bodily location for all emotional experience. Vásquez-Rosati then writes, "emotions are embodied because they are the result of the perception of bodily processes" (p. 225). DES with other participants shows that sometimes feelings have bodily location and sometimes not (Heavey et al., 2017).

The micro-phenomenology study is potentially marred by confirmation bias. It's possible that Vásquez-Rosatia set out with theories of embodied cognition and embodied emotion and found data that accorded, unable to bracket her presuppositions. Another possibility is that embodied emotion really was present for the experiences investigated, but she made a premature inductive generalization that all emotion involves embodiment. Another possibility is that DES is mistaken and bodily feeling really was present for all of Nora's samples and for all participant samples. I hold this as the least likely possibility. In other samples, Nora was able to identify bodily feeling when present. In the two samples above, she was clear that there was no location. And experience of feelings without bodily location is a robust finding, present for multiple participants from my sampling and from other DES research (Heavey et al., 2017; Hurlburt 2011a).

Theories of embodied cognition are themselves suspect from the perspective of DES because they don't acknowledge the multiplicity of individual experience. Some people have high degrees of sensory awareness, and some don't. Some have strong bodily feelings, others don't. Any theory must acknowledge the multi-faceted nature of experience. This isn't to say that theories of embodied cognition can't offer useful insights. Just that they shouldn't be used to draw premature generalizations about inner experience.

Premature generalizations about emotion can come from all directions—not just from phenomenology and cognitive theories, but from neuroscience as well. For example, in proposing a theory of consciousness, Berkovich-Ohana and Glicksohn (2014) write, "Every human experience, those we are aware of and those we are not, is embedded in a

subjective timeline, and is tinged with emotion, be it the subtlest." Is every human experience really tinged with emotion? Nora had plenty of moments that were, but also many samples absent of emotion. Samples without emotion are prevalent across participants. Of course, you could argue that dDES and DES aren't powerful enough, and don't capture subtle emotions. But what exactly are the grounds for Berkovich-Ohana and Glicksohn's argument that emotions are "certainly" omnipresent. The authors offer no phenomenological data. So we simply fall back on their insistence of 'certainty.' Phrases like 'certainly,' 'undoubtedly,' and 'of course' are often good markers that we're dealing with entranched presuppositions and not evidence. When we talk about "human experience," we're no longer talking merely about neural zaps, but about subjectivity. Neuroscience and psychology can't continue to ignore research on subjectivity, regarding emotions or any other aspect of conscious experience.

Back to Nora, feelings occupied not just the process of her experience but also the content. In Sample 4.4, she's having an imaginary conversation about feelings. This mental conversation is with her dad and he asks a "weird dad question" (that's only indirectly about what he wants to ask about). It's about a pit/abyss feeling that Nora had relating to tensions in her family. Nora's mentally responding, "the pit feeling is fine dad." She is simultaneously feeling a bit of this pit feeling.

Another example of the importance of feelings in Nora's consciousness is her experience of other people's feelings. In Sample 4.3, Nora is walking in the street and a woman next to her suddenly switches directions and walks the other way. Nora feels what she described as the woman's confusion. It's different than if Nora herself was confused. She described it as feeling the woman's impulse. What's interesting is that Nora may not have actually experienced seeing the woman switch directions. It may have been subliminal. Nora explained, "you see it and you don't see it at the same time." So Nora may have had an empathic experience of the woman's feelings without even directly seeing the woman.

In another sample, Nora was trying to feel something but not succeeding.

Sample 3.5
Nora is thinking about the relationship of her friends Rosa and Phillip—that they're very close and in their bubble. And maybe it's because Rosa had trouble with friendships and is hard to crack open, and Phillip is one of the only people who can.

This thinking is partially with an image. It's an image of Rosa and Phillip. But it's not so clear. Nora described it as "more like ghosts."

There's also a feeling component to this thought. Or rather Nora trying to feel out what this relationship must be like (but not succeeding at this moment). Nora identified the image, feeling, and thinking aspects as all together, not as three separate things.

Nora also has a sensation in her chest. She described it as "weakness," as "pudding," and as a "hole." It's about the size of a pudding container. <u>Coding</u>: Imaged thought / with cognitive doing, sensory awareness, multiple awareness

The pudding sensation is distinct from the thought/feeling aspect and so might best be called sensory awareness. The main element of experience is a complex one. It involves thought content—about Rosa and Phillip. It involves a 'ghostly' image. And it involves an attempt at feeling, but without any actual feeling. Coding becomes difficult here. Perhaps we have imaged thought and cognitive doing blended together. In any case, coding loses some of its utility.

For other samples though, cognitive doing may be a useful code for Nora. For example, with Sample 2.3 where she's trying to find a word. Or Sample 5.1 where she's starting a daydream but without specific content. Again, we should reiterate that coding remains a heuristic for understanding and comparing experience. But experience may not fit neatly into codes.

Another salient feature of Nora's momentary experience was a mix of simplicity and complexity. Some samples were simple, with only one aspect of experience:

Sample 3.3
Nora is talking, saying "the boulder place is open." Nothing else is in experience.

Other samples were complex. Nora experienced 'multiple awareness' in 8% of samples. The population mean for multiple awareness is below 3% (Heavey & Hurlburt, 2008). Multiple awareness designates experience with multiple elements. And these elements aren't thematically related. An example of what *wouldn't* count as multiple awareness: if you have sensory awareness of black kiwi seeds, while you're innerly speaking "kiwi seeds, kiwi seeds," while you're thinking: I hope I don't get seeds stuck in my teeth before the job interview." While these are three different elements of experience, they're related in content. A sample from Nora, that *does* count as multiple awareness:

Sample 3.2
Nora is walking into a general store saying "hallo."
The music of the store "hits" her. It's a change of surroundings. She isn't noticing any specific aspect of the music, but the change of scene strikes her.
Nora is also imagining her friend Julian playing with the kids at the playground where Nora works. He's picking a kid up by the arms and leg and spinning him around. This scene is with motion. The visual perspective is like real life, like being there.
Nora has a happy feeling in her chest. She isn't sure about size or location since it has "no borders."
Nora is also tired, in her body and eyes. Coding: Speaking, image, feeling, sensory awareness(x2), multiple awareness

Here there are two simultaneous elements of sensory awareness—Nora feeling tired, and being struck by the change of scene. There is also a mental image of her friend playing with kids. And a happy feeling. The happy feeling and the mental image concern the same content. But the aspects of sensory awareness are not related in content, so this can be coded as multiple awareness. All of Nora's instances of multiple awareness were on the 3rd

day of sampling. Perhaps in some periods, Nora's experience is more complex than in others. I don't know what could account for these periods. We'll see later, with our participant Ali, that mood shifts can account for changes in the multiplicity of experience. But I don't know if any such mood shift accounts for Nora's multiple awareness.

What can be said for certain is that our data and previous DES research shows that multiple elements can be in awareness simultaneously (Hurlburt 1993; Hurlburt, 2011a). This counters certain presuppositions, for example that "conscious capacity is limited, and generally consciousness cannot do more than one thing at a time" (Dijksterhus & Nordgren, 2006, p. 96). Avoiding false generalization is why the careful study of consciousness is important.

Temporal experience

With Nora, we switched to dDES after 3 days of standard DES. We conducted 3 more days of dDES, over which we collected 14 samples. It took a bit of practice to adapt to the new method. For the question of how M1 relates to M2, Nora at first kept explaining this in terms of a thematic relation. To make up an example: M1 was about kiwis and M2 was about bananas, so they're related since they're both about fruit. But dDES isn't interested in thematic relations of content. This often involves creating a causal explanation that may or may not have been directly experienced. We're interested in how processes evolve, change, or stay stable over time. E.g.: the M1 kiwi thought decreased, overlapping with the M2 banana thought as it increased. If participants don't know what is meant concerning dynamics over two moments, it can be useful to prompt with some options. You could for example ask, "does the inner speaking diminish, grow, stay stable, or something else, or you don't know?" Giving options can be useful for eliciting an answer. But it is always encouraged to give multiple options so as not to bias.

In terms of temporal dynamics, Nora exhibited Emerging, Disappearing, Overlapping, and Transforming. But the most salient was Switching. Nora had by far the highest proportion of Switching of any participant here. It occupied 50% of her transitions—so 7 out of 14 samples. The average for all participants besides Nora was 17%.

Switching is when experience in M1 shifts to a different experience in M2. There is no gradual fading out of M1 experience. There is no gradual fading in of M2 experience. The transition is abrupt. It happens all at once. An example:
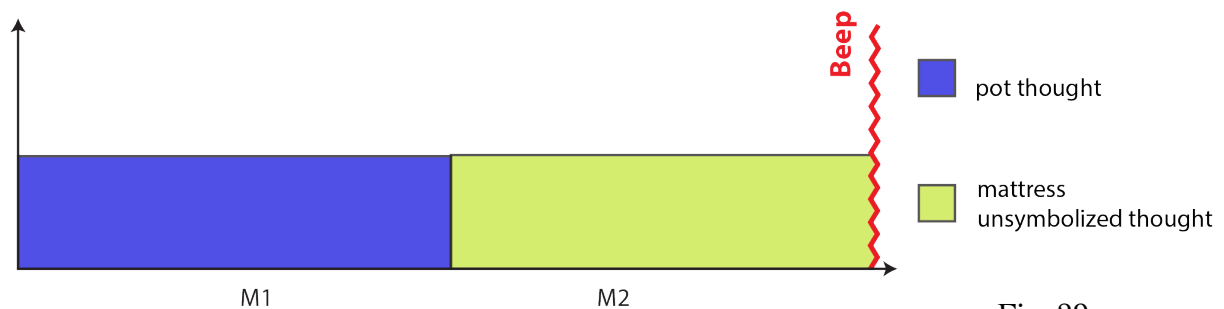
Sample 5.3

Nora is shopping, looking at a pot for camping. At this moment, Nora is thinking: should I buy that pot? Coding: Perceptual(?) thinking

Moment 2
Nora is thinking: does Tami have a mattress to lend me? This is most likely unsymbolized. Coding: Unsymbolized thinking

Temporal
This was a switch from one thought to the next. There wasn't any gradual fading. Coding: Switch

Fig. 29

Nora's transition from one experience to the next was direct and sudden. Often, with her samples, there is no experience from M1 that remains in M2. We can contrast this with Max's experience, which was frequently coded as Overlapping. Experience from M1 continues into M2. There's usually no such continuation with Nora. This shows just how variable temporal consciousness can be. We can't take any aspect for granted, no matter how fundamental it may seem. Even a metaphor like 'stream of consciousness' may not fit everyone (e.g. James 1890/1983; Dainton, 2000; Petitmengin, 2007). Nora's consciousness may be less like a stream and more like a paved sidewalk—one concrete block, then the next, then the next, with clear dividing lines between.

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Another salient feature of Nora's experience is what came to be coded as Focusing/Unfocusing. This occurred in 4 out of 14 dDES samples, so 29%. This is high considering that other participants did not exhibit this phenomenon at all, besides Sophie with one sample. Focusing is when an element enters awareness, but without actually increasing. So the awareness of it increases, but this element itself doesn't increase in intensity. Unfocusing is the reverse—an element leaving awareness but without decreasing. Let's look at an example:

Sample 5.2

<u>Moment 1</u>

Nora is feeling hot and sweaty (it's humid).

Nora is also annoyed (from having to go shopping and being surrounded by shops and people). <u>Coding</u>: Sensory awareness (or perceptual awareness), feeling

<u>Moment 2</u>

Nora is thinking that she wants to buy a hoodie, but knowing her shopping habits, she probably won't.

Nora has a mental image of a sweater. It's changing colors (some maybe being greenish and reddish). <u>Coding</u>: Imaged thought

<u>Temporal</u>

The hot sweaty feeling and the annoyance didn't go away. They stayed present, but left focus. It didn't even make sense for her to say that they decreased, just that they weren't the focus.

The sweater thought and image in M2 came in seemingly all at once. <u>Coding</u>: Unfocusing, Emerging / abrupt (imaged thought)
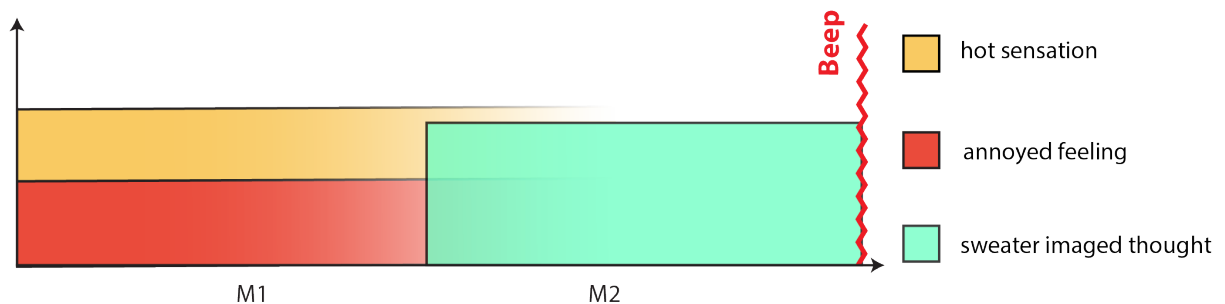

Fig. 30

So Nora's hot and sweaty sensation and her annoyed feeling didn't go away or diminish. But they left the focus of her consciousness. In M2, they were not as present in her direct awareness. Or perhaps they weren't in her direct awareness at all. But if something's not in experience anymore, wouldn't its intensity have necessarily decreased? This was my original assumption. But Nora's reporting of her experience went against my presuppositions. She was clear that it wouldn't make sense to say that the hot/sweaty sensory aspect and the annoyed feeling decreased. This wasn't just an idiosyncrasy in her way of describing. With other samples, she was perfectly capable of describing elements decrease or increase in intensity. Experience of Focusing/Unfocusing was different. Let's look at another example:

Sample 6.4

<u>Moment 1</u>

Nora has a thought about moving to a new apartment and all the things in her room she has to pack. At this time, the thought isn't about any specific things, just all the things in general.

There's also a feeling of mild discomfort. It doesn't have a bodily location. <u>Coding</u>: Unsymbolized thinking, feeling

<u>Moment 2</u>

Nora is asking her friend Simeon [in German]: "does it make sense if I move out in July?" This speaking is experienced.

The feeling of discomfort remains but is not the focus. <u>Coding</u>: Speaking

<u>Temporal</u>

The feeling of discomfort remained throughout. It didn't make sense to say that it 'decreased' in intensity, but it wasn't the focus in M2.

The M1 unsymbolized thinking started fading out and then abruptly ended. The M2 speaking started right when the M1 unsymbolized thinking ended. <u>Coding</u>: Unfocusing, Disappearing
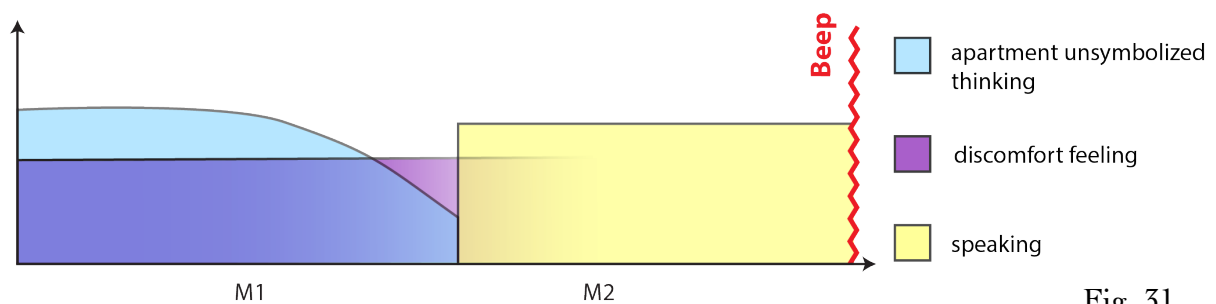

Fig. 31

Again, the feeling of discomfort left focus but without decreasing. At another point, Nora described this phenomenon as "a solid line turning into a dotted line." We can compare this to one sample from Sophie (further details of Sophie's samples can be found in Appendix IC). In Sample 5.2, Sophie was reading a book and had a positive feeling enter her awareness. But it didn't make sense to say the positive feeling increased. Sophie described it as a dashed line becoming solid and thickening. This is the same as Nora's description of a solid line becoming dashed (although the direction is reversed). Due to the similarities of these descriptions, and the certitude these participants had about their experience, I came to see this as a generalizable phenomenon earning its own code.

Does this phenomenon have any corollary in research? Not yet that I'm aware of. DES doesn't mention any such phenomenon, since its temporal scope is limited. However, perhaps this is another way of viewing a phenomenon that DES does discuss—feeling-fact of body (Hurlburt & Schwitzgebel, 2017, p. 187). This refers to emotional activity that isn't in direct awareness. Emotional processes can be ongoing and swerve in and out of awareness. For example, prior to one sample, Mary had been experiencing a warm, loving feeling towards her friend Dave primarily felt as a warm/bubbly sensation radiating out from her chest, and culminating as a tingling sensation on her skin. At the moment of the beep, her entire experience was of an image of paper towels she needed to buy from the store. But she identified that the emotional warm/loving was continuing in her body, outside of

direct awareness (Hurlburt & Heavey, 2006, p. 222). Perhaps Focusing/Unfocusing is another way of looking at the same phenomenon.[32] DES doesn't examine how feelings alter over time. But it has observed that sometimes feelings can be directly experienced, and sometimes emotions can be ongoing but not directly experienced. With Focusing/Unfocusing perhaps we're seeing how these aspects phase in and out of direct experience.

This thesis is about consciousness. But this focus ignores another aspect of the human mind—unconsciousness. Feeling-fact-of-body and Focusing/Unfocusing hint at the unconscious. Perhaps certain processes can be ongoing but outside of direct consciousness. Perhaps it makes sense to call them unconscious processes (although some definitions would call them subconscious).

The study of the unconscious has a long history, from Freud (1915/1963) to psychophysics experiments on subliminal processing and social psychology research on priming (Bargh & Morsella, 2008) to research on the superiority of unconscious decision processes over conscious ones in certain conditions (Dijksterhuis & Nordgren, 2006). DES and dDES can't look directly at unconscious processes, but they can still help clarify conversations. We've seen that DES can sometimes reveal elements that participants weren't previously aware of. If we take unconsciousness to designate what participants aren't retrospectively aware of, then by this definition, DES and dDES can access the unconscious. But if we take the unconscious to designate mental activity that falls outside of subjective experience altogether, then this lies out of range of DES and dDES.

But dDES can still show how consciousness and the unconscious potentially relate. An ongoing process can phase in and out of awareness, without decreasing. We see this with Nora's feelings. Funnily enough, Freud—the great popularizer of theories of the unconscious—rejected the idea that affect can be unconscious, writing "there are no unconscious affects in the sense in which there are unconscious ideas" (1915/1963, p. 127). We see with DES and dDES that some kind of unconscious processing of affect (probably) does occur. Perhaps you could quibble with terminology and argue that once it's unconscious, it's no longer 'affect.' One could then call it 'feeling-fact of body.' Whatever the term, it's likely that emotional processing exists as an unconscious phenomenon. Some more recent studies do indeed support the role of unconscious processing of emotions (Winkielman & Berridge, 2004).

Freud also wrote that the "processes of the system Ucs [his shorthand for the unconscious] are timeless; i.e. they are not ordered temporally, are not altered by the passage of time, in fact bear no relation to time at all" (1915/1963, p. 135). We've seen here that what

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[32] Although it's important to note that Sophie's emotions which were subject to Focusing/Unfocusing were not always physically felt in her body. Hurlburt's term 'feeling-fact-of-body' generally refers to ongoing physical emotional sensations that aren't always in direct awareness. Perhaps a new (though clunky) term 'feeling-fact-of-mind' could refer to ongoing emotional mental processes that aren't always directly experienced.

we could call unconscious (feeling-fact-of-body) is, on the contrary, temporally ordered. Feelings can pass in and out of consciousness, in temporal sequence. Feeling-fact-of-body influences what enters into conscious awareness and is in turned influenced by it. To Freud, the unconscious is outside of time. To dDES, the unconscious is temporal.

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We've seen that Nora had frequent feelings. She also had Switching as a frequent temporal dynamic. Experience switched abruptly from one thing to the next. Transitions from M1 to M2 usually were not gradual. Nora also exhibited what we can call Focusing/Unfocusing. Experience entered or left the focus of consciousness without increasing or decreasing. These aspects that entered or left focus were predominantly feelings. So the salient aspects that standard DES reveals tie into the salient aspects that dDES reveals. Nora had frequent feelings, and these feelings could come and go in awareness, while remaining stable (potentially remaining as feeling-fact-of-body). Our examination of time elucidates Nora's momentary experience and vice versa.

Matej

Momentary experience

Matej is a 22-year-old cognitive science student from Slovakia. He is also studying harpsichord performance at a music conservatory. Matej was careful in carrying out the DES and dDES procedures. He would voice uncertainty—for example, if inner speech was in his voice or not. With many aspects of his experience, however, Matej was quite confident. Let's look at the five frequent phenomena (from Heavey & Hurlburt, 2008) as they pertain to Matej.

Frequent Phenomena	Matej (%)	Average (%)
Inner Speaking	27	26
Sensory awareness	27	22
Feeling	12	26
Images	8	34
Unsymbolized thinking	8	22

As we see, Matej had a below-average amount of unsymbolized thinking, images, and feelings, and a roughly average amount of sensory awareness, and inner speaking. But what was atypical was Matej's specific kind of inner speaking. His was highly localized, in clearly defined areas of his head. His inner hearing was also highly localized and occupied 12% of his samples.

Before we delve into what exactly is meant by highly localized inner speaking and hearing, it's important to bracket presuppositions. Some people I've presented findings to voice doubt about Matej's samples, since they don't correspond to their own experience. As we saw, your own experience is not a useful metric when judging another individual's. DES research has shown that consciousness can be quite variable. It's better to judge validity by judging the interviews and the kinds of questions asked. I used a variety of methods to ascertain if Matej's accounts of his experience were faithful. I tracked his use of subjunctification. He was often very confident of his samples, not hesitating to provide answers. I once asked a trick question, switching up Matej's story (changing the location of his inner speaking). He quickly corrected me. Although the elements of Matej's experience are atypical, I came to be confident of them, as Matej's maintained confidence in his own reporting.

So Matej's inner speaking and inner hearing took place in clearly demarcated areas in his head. Let's look at one example with both an inner speaking and inner hearing component.

Sample 2.2

Matej is typing the letter x on his keyboard. The typing element isn't so present (he says maybe 15% of experience, although potentially less).

Matej is innerly speaking "x," and this has both a speaking and a hearing component.

The hearing component is localized in a small area at the back of the head. If x is pronounced 'ekse,' it's more on the 'kse' part of it. Matej can't say if it's in his own voice or not.

The speaking component is around his wisdom teeth on both sides, with a thin line connecting these two areas. There's nervousness within this area (for context Matej had previously made a typo and is retyping).

The speaking and hearing component are connected, and the two areas are "mentally close," even though they're not so close physically. <u>Coding</u>: Highly localized inner speaking

So we see here that inner speaking and hearing are in clearly defined but physically separate areas. The inner hearing is in the back of his head. The inner speaking is around his wisdom teeth on both sides, with a line connecting. Despite separate localization, the speaking and hearing components are experientially linked. Matej was the only participant from our sampling who demonstrated this phenomenon of highly localized inner speaking/hearing. This is a rare phenomenon, and I am unaware of any other DES participants with the same. Sometimes participants report inner speech in areas like 'their head' but this is never as clearly defined as Matej's localizations. When asked if this localization is metaphorical or literal, most participants have difficulty answering. To Matej, the localizations were literally. Some of his other localizations include: a flat rectangle near the back of his head, a "pancake" at the top of his head, a small globe shape at the top of his forehead, a thin band stretching across the front of his head, a two-dimensional oval at the top of his forehead, a tickling feeling above his palate, and a pitch "approximately a 9th lower than 700hz" resonating around his whole head as if bouncing off his skull.

Matej's inner speaking and hearing was usually without semantic significance. So just the sound, not the meaning—for example an "x" sound, an "oooh" sound, or the "rs" sound from "versi." I should note that Matej is left-handed. A similar phenomenon of "words experienced without semantic significance" was found in a DES study of 10 left-handed people (Mizrachi, 2013, p. iii).[33] But this is somewhat different from Matej's phenomenon. It usually involves innerly seeing these words, absent of their meaning.

In some ways, Matej is similar to other left-handers; in some ways, different. According to Mizrachi, left-handers experience sensory awareness, words without semantic significance, and multiple awareness at a substantially higher frequency than the general population. Left-handers experience inner seeing, inner speaking, and feeling substantially less than the general population. In line with Mizrachi's findings, compared to the general population (from Heavey & Hurlburt, 2008) Matej did indeed have a higher degree of sensory awareness and slightly higher multiple awareness (4% but possibly more depending on

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[33] This may be caused by language lateralization in the brain, which is different for left-handers. Investigation of left-handed experience in conjunction with fMRI could be fruitful.

how one codes). He also had less inner seeing, and somewhat less feeling. However, Matej diverges from these findings in that he did not have less inner speech. The main commonality between Matej's experience and Mizrachi's findings regards words experienced without semantic significance—which is otherwise a rare phenomenon. While it's interesting to note commonalities between Matej and other left-handers, it's important not to take these generalizations too far. Matej is in many ways quite different from other left-handers. The ideographic nature of his experience is as important to note as his commonalities with a group.

We can compare our results to other theories about inner speaking, for example those of Vygotsky, which have been influential in psychology. Vygotsky (1934/1986) argues that in inner speech, the sense of the thought is intact while words are condensed. He writes that, "one word stands for a number of thoughts and feelings." In inner speech, one observes a "decrease of vocalization" and "preponderance of sense over meaning" (p. 248). With Matej, we observe the opposite. Vocalization is not decreased. Often neither sense nor meaning are present. One word does not stand for a number of thoughts or feelings. Vygotsky also writes that it is "a law of inner speech to omit subjects" (p. 243). This is not the case for Matej (or for other participants here). Take the example of Sample 3.3. where Matej is innerly speaking, "do I want to use the burnt butter?" The subject 'I' is intact. Results from Matej therefore counter Vygotsky's theorizing. It should be noted that Matej's experience is atypical, so perhaps Vygotsky's theories hold for other people. But Hurlburt & Heavey (2018) observe this not to be the case. Subjects are most often not omitted, and vocalization is often not decreased. Our findings and Hurlburt & Heavey's findings demonstrate the importance of empirical investigation. Careful observation of inner experience is a necessity before any generalizations are made.

Matej had other elements besides inner speaking/hearing that were highly localized. He also had highly localized feelings. For example, a feeling of nervousness (from having to multi-task) localized on the surface of his scalp.

He also had highly localized unsymbolized thinking. For example, in Sample 3.2 Matej has what he calls a "silent thought" that he kows how to spell "dephosphorelation." "Silent thought" is Matej's term for a phenomenon that could be grouped as unsymbolized thinking. It involves thoughts without images, inner speech etc. This silent thought has a location in a thin plate behind Matej's left eye (from the middle of his forehead to the middle of his cheek).[34]

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[34] You could argue that since this thought was about a word, that it was symbolized. But the thought didn't involve any specific aspect of the word, and wasn't innerly spoken, or heard. It was about knowing how to spell the word. For these reasons the code 'highly localized unsymbolized thinking' still makes the most sense. You could also argue that the localization itself is a kind of symbolization. In which case, fair enough, perhaps 'highly localized thought' best describes it.

In two instances, Matej had a sort of 'phantom' location. For example, in Sample 1.4 he's innerly speaking a name and has the sensation of moving his tongue—but slightly behind his actual tongue. In Sample T1.5, he feels a tension in his shoulder, lower than his actual shoulder but retaining the same shape.

Altogether we can note that localization was a salient aspect of Matej's inner experience. This clarification of momentary experience will be useful when we examine temporal experience. We can see how Matej's localizations evolve and shift over time.

Also of note for Matej's momentary consciousness is anomalous experience of color. For instance, Matej often had the impression of a color being present without that color actually being visible. For example, in Sample 3.3 Matej is innerly hearing "do I want to use the burnt butter" and has an impression of grayness along with this. In sample 3.1 Matej has an image of the words "memory acquisition" and the image has a yellowish feel even though there's no actual yellow color.

Another example of anomalous color experience is in Sample 5.3. Matej is angry. This anger manifests as a transparent red "curtain" that lowers and covers his field of vision. Hurlburt reports that visual experiences of the color red during moment of anger do occasionally occur, hypothesizing that the idiomatic expression 'seeing red' has an actual experiential basis (Hurlburt 2011a, p. 253). He writes, "my subjects have (I think credibly) reported 'seeing red' when angry, 'being blue' when depressed, and 'seeing rose-colored hues' when optimistic" (Hurlburt & Schwitzgebel, 2007, p. 72). Noting Matej's anomalous color experience, we can look further into its temporal dynamics, and the dynamics of his consciousness in general.

Temporal experience

Sample 5.3 offers a good opportunity to investigate experience within moments, not just between moments.

Sample 5.3

Moment 1

Matej is wondering: what workshop? (In response to an email, wondering whether his supervisor or his professor is giving a workshop). This thought doesn't have words to it, but if expressed, it clearly would be the words "what workshop?"

Matej is also seeing an image of his supervisor and his professor. The image is from the shoulders up. Their features weren't so clear. They're overlaid on the environment he's in (although it's unsure if this is a mental image of his environment, or his actual environment that he's perceiving.) Coding: Unsymbolized thinking, image

Moment 2

Matej is experiencing a feeling of anger and confusion towards his supervisor concerning his project (because he hasn't sent an important piece of data). Part of this is a transparent red "curtain" that's lowering and covering his field of vision. It gives the world behind a red tinge. Another part of this feeling is tension in his skull. It's itchy, and mostly above his temples. The
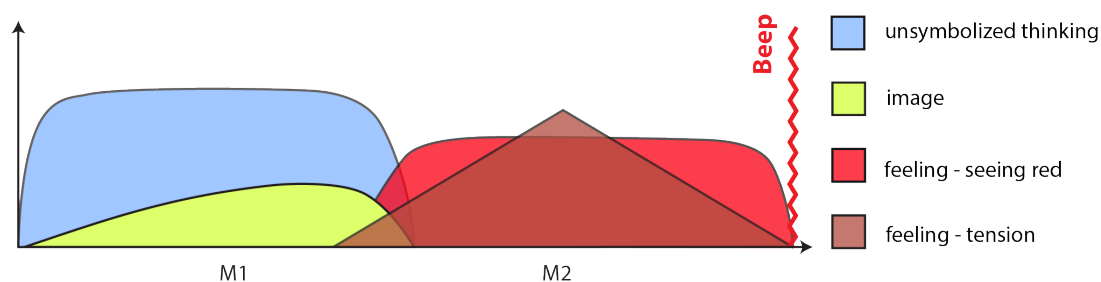
tension grows and fades within this moment. <u>Coding</u>: feeling (with a visual and sensory component)

<u>Temporal</u>

The unsymbolized thinking (what workshop?) started at the beginning. The M1 image "faded in" over the course of that moment.

The M1 image and unsymbolized thinking faded out as the M2 feeling emerged. There's a cross-fade where they both overlap. The tension increases and diminishes over the course of M2. <u>Coding</u>: Intra-moment change / rise (image), Disappearing (unsymbolized thinking), Intra-moment change / spike (tension), emerging (seeing red),

Fig. 32

We see that experience doesn't just shift between moments. It can shift within moments as well. Matej's image increases in awareness within M1. We could call this a rise. Within M2, the feeling of tension that's part of anger quickly grows and fades. We could call this a spike. Samples from other participants showed this as well. For example, in Sample 5.4, Max had a spike of a good feeling accompanying the sound of a bassline entering a song. Experience can alter within moments. It can grow or recede, spike or dip.

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After two days of standard DES, we switched to dDES and continued with sampling for three days. We conducted in-depth interviews for 9 of Matej's samples. For Matej, dDES was not harder than standard DES. He said that once he was able to apprehend one moment, he was able to apprehend two. In some instances, apprehension of the moment before 'the moment of the beep' helped clarify 'the moment of the beep.' For example:

Sample 4.1

<u>Moment 1</u>

Matej is innerly speaking "normalne" [normal, in Slovak, from the sentence "this is not normal"]. This is located in the middle of his head, above the palate. It manifests as a ticklish feeling, as if tickling from above. The speaking and hearing are a product of this tickling.

Matej also has a feeling of anger. It may be localized in his chest, but this isn't certain. <u>Coding</u>: Highly localized inner speaking, feeling

<u>Moment 2</u>

Matej is moving his backpack. This movement is the main thing in his awareness.

Also present is feeling the straps in his hands, and the coldness of the straps. Also present is the visual experience of seeing these.

The anger is still present for this moment. <u>Coding</u>: Doing, sensory awareness, perceptual awareness, feeling

<u>Temporal</u>

The anger stayed at the same level through M1 and progressively disappeared once Matej grabbed his backpack. It wasn't completely gone by the time of the beep.

The inner speaking and tickling feeling left once the sentence was done ("as soon as I finished the word"). <u>Coding</u>: Overlapping / altering (anger), Disappearing (inner speaking), Emerging (doing, sensory awareness, perceptual awareness)
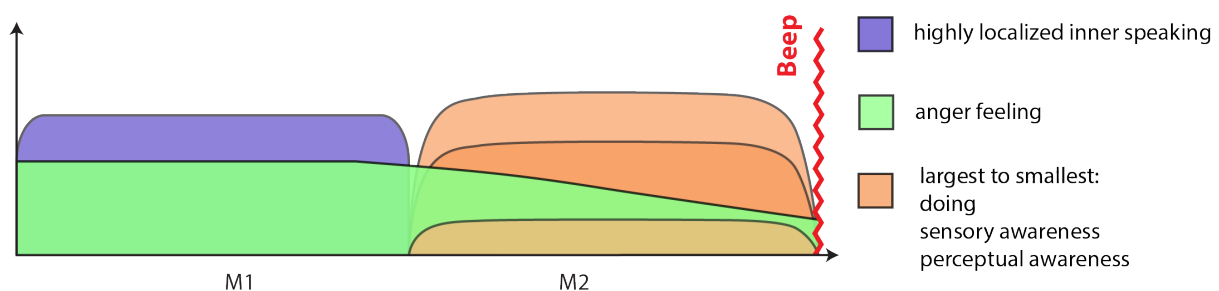

Fig. 33

When he first described M2, Matej didn't describe the anger. But once he was describing the relation between M1 and M2, he noted that the anger still wasn't gone by the time of the beep. So dDES may clarify some elements that DES misses. Recall that DES would've only looked at M2, not M1. Some kinds of experiences may come into relief only by looking at how they change over time. Another possibility is that dDES led Matej to a false conclusion that anger stayed in experience for M2. Perhaps it remained as feeling-fact-of-body, but not as direct experience. Interviewers must retain this as a possibility, and indeed I did question Matej if anger stayed in direct experience. He was confident of it. Yet the iterative training of DES and dDES allow the interviewer to keep pushing the participant's skepticism and rigor throughout the process.

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One salient aspect of Matej's experience was dynamics coded as Transformation. This is where experience in M1 alters to a new experience in M2. The M2 experience is still related to the M1 experience. It's a continuation not a disjunction. This coding isn't common. For participants besides Matej, it occupied 7% of total transition. For Matej, it occupied 22% of all transitions. Let's look at an example.

Sample 3.1

<u>Moment 1</u>

Matej is reading a textbook. He has an inner image of the words "memory acquisition." They're overlaid on the actual textbook, taking up the space of 2 or 3 lines of text. The letters are blue. The whole image has a yellowish feel although no yellow color.

Matej is also innerly hearing something but he's not sure what, and it's not so clear. It's in the front part of his head, in a thin band stretching across, and more on the right side.

Matej is also thinking: Do I even need this for the presentation? This is unsymbolized. <u>Coding</u>: Image (with impression), highly localized inner hearing, unsymbolized thinking

<u>Moment 2</u>

Matej is innerly speaking either the word "consolidation" or "acquisition." The meaning is not so present. The word is coming from the middle right side of his head. It's resonantly filling the whole head. In addition, there are "delicate changes of tension" on his scalp, all around his head. <u>Coding</u>: Highly localized inner speaking

<u>Temporal</u>

The M1 inner hearing in Matej's forehead moves to the M2 inner speaking area in the middle right part of his head. It's the same aspect, moving—not a different aspect in a different location. After it changes location, it rapidly spreads out.

The visual element becomes less present. It disappears at the same moment that the voice fills the whole head. <u>Coding</u>: Transformation (inner hearing to inner speaking), Disappearing (image), Disappearing (unsymbolized thinking)

Fig. 34
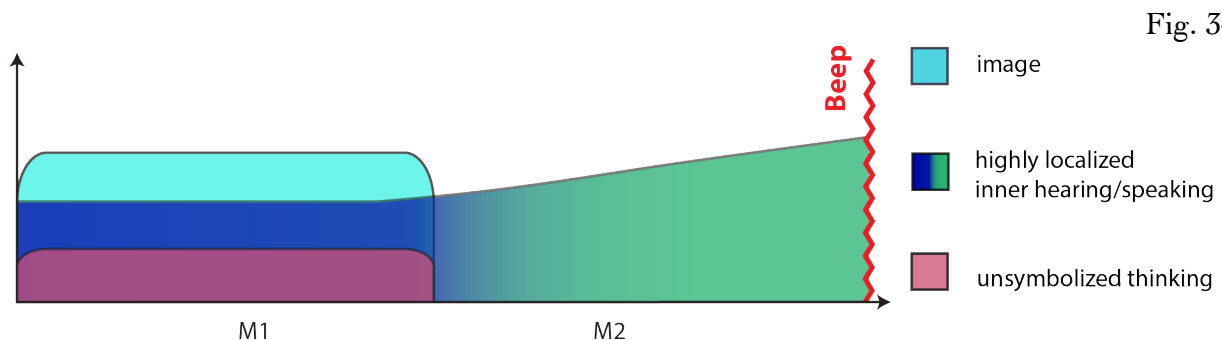
So we see that the M1 inner hearing transforms to the M2 inner speaking. This isn't a completely new aspect. The forehead location in M1 moves to the middle right of the head in M2. It rapidly spreads out from there, resonantly filling Matej's entire head. Concerning coding, you could ask, couldn't this be considered Overlapping / altering? Couldn't we consider it the same element spreading across both moments? This is a possibility, and the boundaries between codes aren't so solid. But the experience does change quite a bit. It shifts from inner hearing to inner speaking. For that reason, Transformation is a better code.

But coding only matters so much, confronted with the idiosyncrasies of individual experience. What's certain is that Matej's experience is like no other participant's. Highly lo-

calized inner speaking and hearing wasn't present for anyone else. And his temporal experience is unique as well. We can see that this relates to his unique momentary experience. His highly localized aspects of experience could transform from one moment to the next. They could shift to different areas of his head. Or in Sample 3.3 they transform and shift to different areas of his arm.

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Matej had other ideographic temporal dynamics as well. In Sample 4.2, inner speaking occupies a flat, thin shape at the top of his head. It gathers up to a bubble and disappeared.

In Sample 3.2, Matej had what could be called a Grace note of experience (similar to Sample 4.5 that we saw with Adrien). In M1, Matej had the thought that he knew how to spell "dephosphorylation." In M2, he was innerly speaking "lation." Between these moments came a very short aspect of experience—so short that it didn't make sense for Matej to count it as its own moment. It involved uncertainty over whether an i or y comes after "dephosphor". This was located in a small area in the front center of his head. So we previously saw the code Grace note with Adrien. For Matej, this aspect is imbued with the particularities of his experience. It, again, involves a highly localized aspect of uncertainty (perhaps it could be called a highly localized feeling). So Matej's unique momentary experience plays into his unique temporal experience. Let's look at another example of how the dynamics of Matej's localizations play out:

Sample 4.3

<u>Moment 1</u>
Matej experiences a frozen sensation move across a broad region on his upper forehead. It moves left to right. It feels solid and cold. This coldness isn't just metaphorical. This feeling also contains meaning—that there's something being built at the Slovenska cesta construction site in Ljubljana. The meaning is inherent to the frozen feeling. <u>Coding</u>: Highly localized impression

<u>Moment 2</u>
Matej is innerly speaking "parkirišče" (Slovenian for parking place). It's quiet and localized in a thin "2D" shape he describes as a small "pancake" near the top of his head. He's not aware of the meaning in this moment.

There's also a cold, clear feeling. The cold is more than just metaphorical. Matej used a metaphor of a foggy winter snowstorm. Once the storm stops, you see the snow on the ground and trees, and "the feeling is very cold but very clear." <u>Coding</u>: Highly localized inner speaking, impression

<u>Temporal</u>
The frozen feeling disappeared. In its wake was a clear feeling. So in that sense, the clear feeling was different than the frozen one, but still caused by it.

The inner speaking comes in once the frozen feeling disappears. <u>Coding</u>: Wake(?), Emerging (inner speaking)
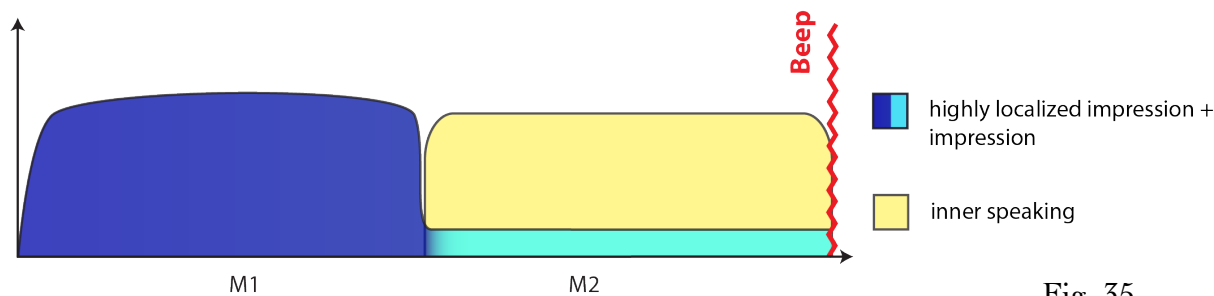
Fig. 35

For this sample, I developed a new code that I thought might become useful—a Wake. But in subsequent sampling with other participants, this code never emerged again. It was useful only for describing this one experience (and not included in our Chapter 8 code list). So, again, this is an idiosyncratic sample. The cold sensation in M1 lifts in M2. But in its wake, it leaves another element of experience—a cold clear feeling (or impression). So an M1 element disappears in M2 but still influences an M2 element. Leaving coding aside, we can understand this in relation to Matej's unique highly localized experience. These localizations could shift. They could expand to fill his head. They could shrink to a bubble. They could disappear leaving remnants in their wake.

Other idiographic codes emerged with Matej, but these were less certain. For example, Layering (Sample T2.3): an element enters as another layer over a previous one. The elements are related as part of the same process. Or another potential code, Encompassing (Sample 5.1): two elements in separate moments are experienced as part of the same overall process. These codes are unsure. They occurred for only one sample each. Perhaps with more sampling with other participants, they could emerge as useful codes. Perhaps not. DES and dDES—as we've reiterated so many times you're probably bored by now—are idiographic. Some temporal dynamics might be present only for a single participant. Some might be present for a single sample! The goal of these in-depth case studies is to present the broad spectrum of individual experience.

Matej had a high proportion of these unique temporal experiences that didn't fit well into other codes and potentially warranted their own codes. Of the participants here, he also had the highest proportion of momentary experience that didn't fit into previous DES codes. Perhaps unusual experience and unusual temporal experience go hand in hand. They do for Matej at least.

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Most of our analysis so far has been regarding implicit time. But did Matej have any instances of explicit time? There is one example. In Sample T2.2, Matej is engaged in the Libet task (as seen in Chapter 15). In M1, Matej is experiencing the speed of the task. He described this like being in a video game car race and accelerating suddenly at the start.

He brought up this description repeatedly, each time insisting that it was more than meta-phorical—it was *that exact feeling*. There exists a good deal of sociological, psychological, and neuroscientific research regarding the connections of time and space in the brain and mind (respectively, Núñez & Cooperrider, 2013; Boroditsky & Ramscar, 2002; Kraus et al., 2015). In one of the few DES samples where time perception is direct, space is also in-volved. Matej is experiencing speed through an experience of space—of acceleration. It's also interesting to note that, in this moment, experience of time is built up relationally, through relation to other moments. Is our sense of explicit time built up relationally, by comparing durations to other durations, speeds to other speeds? We can't generalize from this one sample, but it does hint in an intriguing direction. This thesis deals mainly with implicit time, with a few excursions into sparse samples regarding explicit time. But if the project of dDES is continued, we could build up models for the phenomenology of explicit time as well.

Another interesting sample involves causality without temporality.

> **Sample 1.3**
> Matej hears the phrase "we crossed out" in Slovenian. This is not his voice. It's the voice of a person writing an online post, even though Matej doesn't know that voice in-person. It's male and low. It's localized in a 3D oval shape near the top of his head. The voice has reverby quali-ties as if it's resonating around that oval shape.
> Matej is also feeling calmness. This is experienced as tickling in the oval region. <u>Coding</u>: Highly localized inner speaking, feeling

The inner hearing caused the calmness. Matej said, "It was at the same time, but there was causality. But the causality wasn't temporal." Note that this is just one sample on the first sampling day. It may be premature to generalize that causality without temporality can occur in consciousness. But it's a possibility. It can't yet be ruled out.

Do dDES samples need to conform to our conceptions of physical reality? In standard physics, causality implies temporality. Still, there are quite a few comparisons between physics and consciousness that can be made, but mostly not with macro-level physics—with quantum physics. In this domain, temporality and causality aren't so straightforward. More on these connections in Chapter 17.

For now, what's important to note is: no, mental phenomena do not need to conform to our conceptions of reality. Consciousness can have its own structure, its own logic. Phe-nomenology was founded on the 'phenomenological reduction,' bracketing connections be-tween the outside world and the inner world. Husserl wrote that phenomenology is con-cerned only with subjective reality and based on this, "we know nothing about" the reality of the physical world (1928/1991, p. 10). The same could hold in reverse. Based on our knowledge of physical laws, *we know nothing about* subjective realities.[35] We may think that

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[35] A counterargument to this broad claim could regard inferring mental states from neural activity, a to-pic we'll deal with in Chapter 15.

in the real world, causality without temporality is impossible. The glass can't break right as it starts to drop. But in mental life? We can't rule it out.

13. Ali

Momentary Experience

Ali is a 30-year-old psychology student. He's a visual artist as well, creating works that draw on his life, studies, and imagination. Before we started sampling, Ali had some prior experience with DES as part of a class project. But he hadn't tried the full method where beeps are delivered through an earbud. He noted that the earbud made a difference and enabled him to more accurately identify the moment of the beep. This is why following the full method is advised for all those interested in trying out DES. Ali's understanding of the moment of the beep improved throughout the sampling period. We carried out three days of standard DES and two days of dDES.

We should note Ali has been diagnosed with bipolar disorder. He had a manic phase that was present on day 3, peaked on day 4, and was still present on day 5. We'll see later how this ties into his temporal experience.

First let's look at Ali's experience in relation to the five frequent phenomena (from Heavey & Hurlburt, 2008).

Frequent Phenomena	Ali (%)	Average (%)
Feeling	28	26
Images	24	34
Sensory awareness	20	22
Unsymbolized thinking	16	22
Inner speaking	16	26

As we see, Ali had a roughly average amount of feelings and sensory awareness, and a somewhat below-average amount of images, unsymbolized thinking, and inner speaking.

A salient aspect of Ali's momentary experience was elements that straddled multiple codes. For example, in the feelings category above, I also included 'thought/feelings' which took up 16% of Ali's samples. In the images category, I also included 'imaged thought' which took up 16% of Ali's samples. Many elements of Ali's experience couldn't fit neatly into codes and mixed aspects from different modalities.

Thought/feelings is a useful code for an element that has more specific content than a feeling, but is too emotional to count as a thought. For instance, in Sample 5.3 Ali is recalling a good conversation he had with his friend. He's thinking and feeling that it was a good conversation. There's no bodily location to the feeling. Since this combines components of thinking and feeling, the code thought/feeling fits.

Imaged thoughts involve a thought component and an image component. These aren't separated. They're part of the same experiential element. For example:

Sample 3.1

Ali is listening to an audiobook and hears a woman's voice reading "you will not see but the night, nothing else." Hearing the auditory qualities isn't so present in his experience, which is more focused on the context and meaning

He is thinking about what it means to see nothing but the night. This thought is with an image. The image is of a dark street, with street lamps, the moon, and a man standing. The man is not so detailed. In terms of visual space, the image doesn't quite have borders but it's still as if on a screen in front of Ali. There's nothing outside this screen in his visual awareness—it takes up the whole visual space. The image is the meaning. It wouldn't make sense to say that there's an image and separate unsymbolized thinking. The thinking aspect is through the image.

There's an impression along with the image—a wet cold, humid, rainy impression. There's no bodily localization to this.

Ali also has a feeling of sadness—not that he's sad, but that he's feeling the man's sadness. The sad feeling and the wet, cold, humid impression are distinct strands, but they aren't entirely separated. <u>Coding</u>: Imaged thought, impression, feeling

So Ali is thinking about what it means to see nothing but the night. But this thought isn't separate from the image of a dark street with a man standing. The thought is through the image. 'Imaged thought' emerged as a useful code for other participants. But for Ali it was especially salient. He had more imaged thought than simple mental images.

Ali also had a high proportion of partially worded thought, at 20% of his samples. Heavey and Hurlburt (2008) found less than 3% of samples involved this element. Partially worded thought is similar to inner speaking or inner hearing, but not every word is present. There is meaning beyond the words that are present. For example, in Sample 4.4 Ali is thinking: 'Should I clean and pack? Michi [his boyfriend] might help. Should I ask? I'm sure he will help.' These thoughts come rapidly. They aren't entirely worded, but include words like "clean," "pack," and maybe others. So there's meaning beyond these words.

You could think of 'partially worded thought' as straddling 'inner speaking' and 'unsymbolized thinking.' 'Imaged thought' straddles 'images' and 'unsymbolized thinking.' 'Thought/feelings' straddle 'feelings' and 'unsymbolized thinking.' So taking all these codes together we see a salient feature of Ali's experience. He had frequent experience that involved a thought component combined with other sensory modalities. He had frequent experience that couldn't be neatly coded.

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Ali's inner experience is not limited to his bipolar disorder. Nonetheless, we could compare Ali's experience with the experience of other people with bipolar disorder. Two DES studies exist on this topic (Kang, 2013; Kang, 2015).

Kang (2013) found sensory awareness to be the most common feature of individuals with bipolar disorder. These participants also struggled to apprehend coherent experience. They had a number of samples without clear experience. They sometimes had multiple experiences at once and were overwhelmed by this multiplicity.

We don't want to arbitrarily draw connections. Ali did have a fair amount of sensory awareness, but this wasn't inordinate. In fact, it wasn't higher than the average from Heavey and Hurlburt (2008). Ali also had moments he called "mind absent" which bear similarity to Kang's finding of samples without clear experience.

Kang (2015) does find something similar to what we called thought/feelings: "feelings were commonly so intertwined with thoughts it was difficult for participants to distinguish whether a thought or a feeling was present in their experience" (p. 40). We saw that with Ali there was no need to make this distinction and choose either 'thought' or 'feeling.' The coding of 'thought/feelings' allowed us to describe both of these experiential aspects as they manifested—combined, not separated.

While these are noteworthy commonalities, our main findings with Ali regarded temporal experience, not momentary experience. As we'll see in the next section Ali often had what we can call Rapid fluctuating awareness. Experiential aspects came rapidly one after the other, sometimes sequentially, sometimes overlapping. This may be another way of observing the phenomenon that Kang describes as "multiplicity of experience" (2013, p. 39). But whereas Kang observes multiple elements within a single experiential moment, we observe multiple elements extending in time, coming rapidly one after the next. DES may offer one view of a phenomenon, and the broader temporal scope of dDES offers another view. But let's hold off on speculation that this is the same phenomenon, and let's look at the thing in question.

Temporal experience

Before we delve into Ali's implicit temporal consciousness, let's look at his sense of explicit time. We have one sample where Ali is directly aware of time. Direct experiences of time are rare. For this sample, Ali is high from cannabis.

> **Sample 2.4**
> Ali is unwrapping wires. He's feeling the wires on his fingers.
> There's a visual component to this too. He's seeing the tangled wires. His vision isn't quite continuous. It's more like one discrete moment after another.
> Ali is also feeling that time is passing slowly and that this task is taking forever. He describes this as more of a feeling than a thought. Part of this is also knowing time is passing slower because he's high.

There may be a small volitional aspect present—of wanting to untangle the wires, and of wondering if he was doing it right. <u>Coding</u>: Sensory awareness, perceptual awareness, impression(?), volition

So time is passing slowly and Ali understands this is because he's high. It's curious that Ali describes this more as a feeling than a thought. DES usually reserves the code 'feelings' for emotional experiences, so it's uncertain if this would apply. Perhaps it would be best coded as an impression. Problems with coding raise interesting questions—why is it so hard to code an experience of time? What exactly is an experience of time? How is temporal experience constructed?

We can compare this sample with other findings. Previous research also indicates that time seems to pass slower when high (Tinkleberg et al. 1976). Subjects estimate more time has elapsed than actually has. But perhaps this just regards explicit time, not implicit time. This sample, too, regards explicit time. But is implicit time changed as well? More dDES sampling would be needed to answer.

Also of note in this sample is that vision isn't quite continuous. It's more like one discrete moment after the next. Might this change in perception be behind the explicit feeling of time passing slowly? And what does this discrete vision say about how temporal consciousness is composed? Recall our models of retentionalist, extensionalist, and cinematic consciousness. This sample calls to mind the cinematic view of consciousness, where experience is divided into atomistic moments—like frames in a movie that only show motion when played fast. Ali's vision is like a slowed-down movie, where each frame lingers before switching to the next. But does this hint at how temporal consciousness is composed or is it merely a form of altered consciousness due to the cannabis?

We've raised more questions here than we've answered. This is only one sample, and there's only so much it can tell us. A more thorough study of experience under the effect of cannabis would be enlightening. How exactly does it affect implicit time as well as explicit time? Leaving these questions lingering, let's look at other dimensions of Ali's temporal experience.

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Ali's experience involved a number of temporal dynamics—Disappearing, Emerging, Overlapping, Buffer, Switching. The most prominent finding regards his Rapid fluctuating awareness. During his hypomanic phase, Ali's experiential elements came and transitioned rapidly. Three subcategories emerged—overlapping, semi-overlapping, and sequential. Another potential code emerged—Sequential grouped awareness. But it's less certain if this is a worthy category or an artifact of the sampling method. We'll look at these codes in turn.

Let's note that Ali's manic phase seemed to peak on the 4th day of sampling. 75% of samples from this day were coded as Rapid fluctuating awareness. An example:

Sample 4.3

<u>Moment 1</u>

Ali is reading a text message. He's thinking: I don't need to reply, "or should I?" This manifests as conversation between two parts of himself. It's hard to say how these two parts are distinguished, and how metaphorical this dialogue is. There aren't different localizations, for instance. However, the 'I don't need to reply' part is with unsymbolized thinking. The "or should I?" part is with inner hearing.

Also present is the decision not to reply more. It's experienced as an answer to the "or should I?" question. It doesn't have a bodily location or any symbolic aspects. <u>Coding</u>: Unsymbolized thinking, inner speaking, volition(?)

<u>Moment 2</u>

All of this occurrs very rapidly. In Ali's awareness is: taking a sip of coffee, noticing the bitterness, and the lack of sweetness (with all of these being different aspects). The lack of sweetness is a sensory thought, with the content 'this is not so sweet,' but without words to it.

Then Ali notices a dog and person on the balcony across.

Then Ali thinks about the person he's texting being nice. Then Ali innerly speaks "that made me smile" in his voice, with normal vocal characteristics. Then Ali thinks that the person is giving good vibes. This thought/feeling has no bodily localization. <u>Coding</u>: Doing, sensory awareness(x2), perceptual awareness, unsymbolized thinking, inner speaking, thought/feeling, multiple awareness

<u>Temporal</u>

First came the 'I don't need to reply, "or should I?"' element. Ali wasn't sure if these components were sequential or simultaneous.

Then came the decision not to, like an answer to the "or should I?" element.

And then very rapidly in roughly this order came the coffee sip, bitterness, lack of sweet sweetness, dog and person, the other person being nice, "that made me smile," and the good vibes thought/feeling. This wasn't just sequential. There was some overlap. But it's hard to distinguish what overlapped with what. It all came very fast. <u>Coding</u>: Rapid fluctuating awareness / semi-overlapping
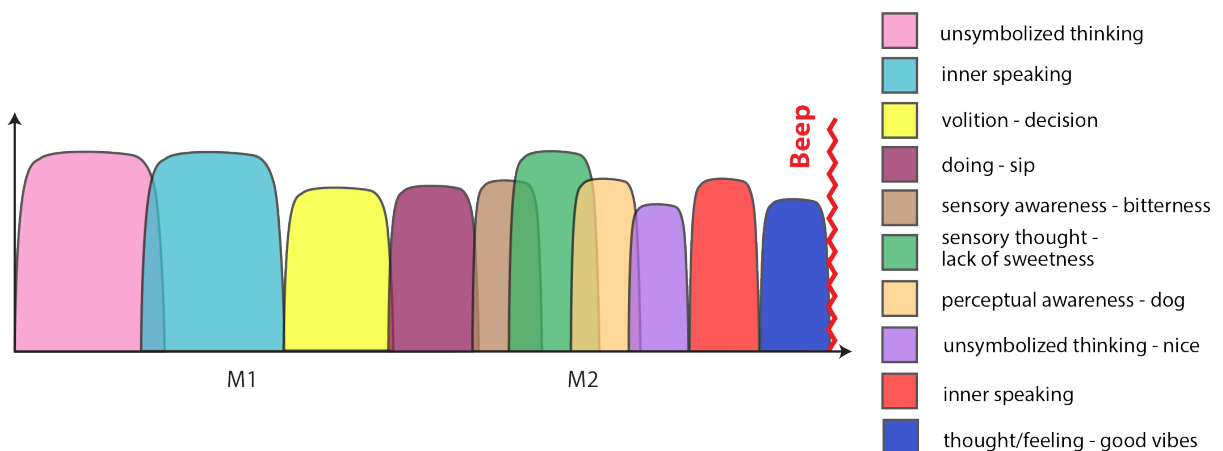

Fig. 36

This can be coded as Rapid fluctuating awareness, with the subcategory semi-overlapping. In a very short span (Ali said it could have been a fraction of a second), multiple experiential aspects entered. The DES method requires the interviewer to remain skeptical of all reported elements, especially uncommon ones. The point is not to say, 'that experience is atypical, it must be invalid.' The point is to subject any reported experience to rigorous questioning to determine its fidelity. Here I must admit that I was skeptical that all these elements could have been present in so short a time. I was skeptical that they really constituted a single moment. Ali reiterated that there was no way he would further divide the moment—that it wouldn't make sense concerning his experience.

We have other samples from Ali (including dDES samples) where his experience does consist of just one element, so this removes doubt as to his ability to separate individual moments of experience. I gained confidence that however one divides these moments of Ali's experience, they did occur rapidly. Ali tapped out the pace of his experiential elements, and the result was a rapid trill. I became confident in defining Rapid fluctuating awareness as an important element of Ali's experiential field, at least during this more hypomanic period. Another illustrative sample:

Sample 4.2

<u>Moment 1</u>

As context, Ali is wondering if he can smoke out the window and is remembering the angry lady who stared at him before (possibly for smoking, although maybe for talking on the phone).

At this moment, Ali has a mental image of the lady. The perspective is from his window to hers, on the opposite side of the building's corner. She looks angry. He can see her and the window and wall around her. There are no borders to this picture. It's like he's in the space as an observer.

Ali also has the worded thought: "maybe it was because I was talking on the phone." This is in inner speaking or at least partially worded speaking.

The sound of an audiobook is maybe in experience, but not so present. <u>Coding</u>: Image, inner speaking(?)

<u>Moment 2</u>

Ali makes a decision to smoke. This decision doesn't have a location. It would be hard to categorize it as a separate thought—Ali calls it a resolution of tension. But it isn't just the absence of tension, it also has a presence.

Then he innerly speaks, "maybe turn off the light." The voice is playful/sassy in tone.

Simultaneously, from the audiobook, he hears the phrase "the man with the mustache." He has an image of a mustache. It's just of a mustache, with no face, and a white background. It's small and doesn't occupy much of his visual field. <u>Coding</u>: Inner speaking, volition, perceptual awareness, image, multiple awareness

First Ali had the image of the lady. Then "maybe because I was talking on the phone" emerged over that. Then the decision entered and the other elements immediately went away. Innerly speaking "maybe turn off the light" was simultaneous with the decision. The audiobook element faded into presence during this. And then the mustache image emerged briefly towards the end, right before the beep. <u>Coding</u>: Rapid fluctuating awareness

Fig. *37*
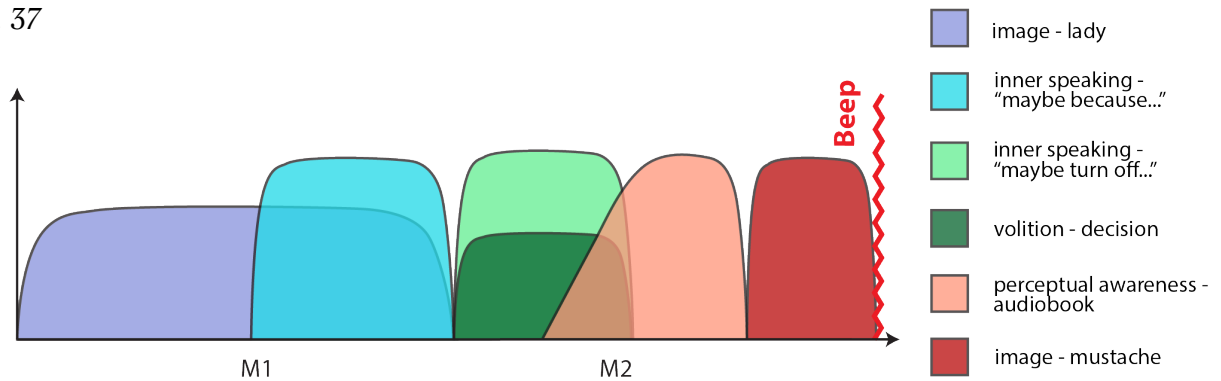
Multiple elements enter and disappear. Sometimes they overlap. Sometimes they come one after the other. Sometimes they're simultaneous. It's a bit like a dinner with your extended family, where everyone has something to say. Some people talk at once. Others talk fast one after the other. Voices cut each other off. The patter has a rapid, breathless pace.

We should note that with standard DES, the elements in M2 would be categorized as multiple awareness. Here they're categorized as Rapid fluctuating awareness. So DES has one way of looking at it, but bringing in a temporal dimension gives us another perspective.

Although we should note that DES research with bipolar individuals did sometimes observe rapid succession. For example, in one sample, Jessica has seven images in rapid succession (Kang, 2015, p. 141). So maybe DES is capable observing rapid succession when it does occur. But perhaps at other times, since temporality is not an explicit part of the method, change over time gets ignored. Kang did not report rapid experience as a main feature of bipolar experience. And again, it's possible that it's not. A dDES study of the inner experience of bipolar individuals would help answer this question.

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There was another category that emerged from Ali's experience—Sequential grouped awareness. But I'm not sure if this is a useful category or an artifact of the method. It involves multiple elements one after the other. But these elements don't arise so rapidly. I wondered, couldn't each element be grouped as its own moment? But to Ali it didn't make sense to subdivide them. Let's look at an example:

Sample 5.1

<u>Moment 1</u>
Ali is thinking about determinism. The line of thinking is about how the sun and earth are determined, and nothing will change that. But the decision to eat a cake or a peach, is that determined? Until the decision, it's not. Or is it?

This thinking is mostly unsymbolized. However, some aspects are symbolized. There's an image of a cake. It's from a first-person perspective, with Ali in a supermarket holding the cake. He can see the bakery section and a sales clerk behind. But the image is mostly about the cake. There are no borders—it's more like being there in the supermarket.

The "or is it?" component is innerly spoken. This is Ali's voice with normal pitch and speed.

Ali sees these elements as comprising one moment because of the thematic link. However, they are not so fast one after the other. They have a somewhat deliberate pace: for example, counting out loud "1 and 2 and 3." <u>Coding</u>: Unsymbolized thinking, image, inner speaking

<u>Moment 2</u>
Ali is still thinking about determinism—about what it means for creativity. If someone creates something but their actions are determined, does it really matter? Do they still deserve praise?

Some words are present, like the word "determinism." However, not all the thought is-worded. This moment also consists of several thoughts at a deliberate pace. <u>Coding</u>: Partially worded thought

<u>Temporal</u>
There was a buffer between the two moments. This was a period with little or no experience (or at least no remembered experience). But the two moments were still thematically connected. <u>Coding</u>: Buffer, Sequential grouped awareness(?)
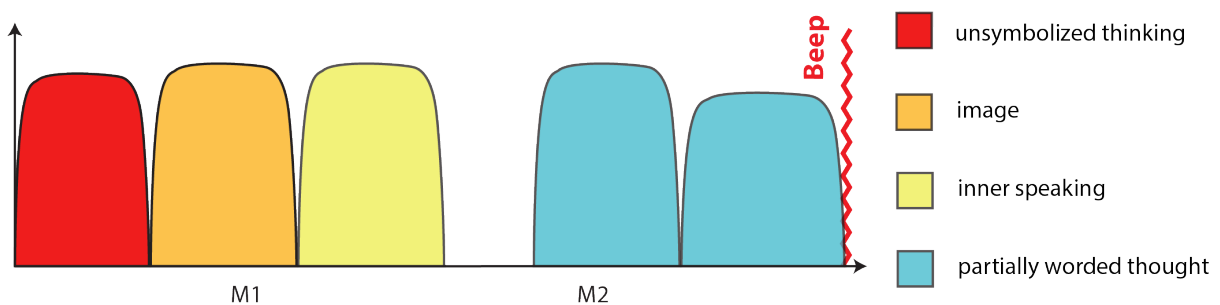
Fig. 38

Whereas I came to accept Ali's Rapid fluctuating awareness as contained within a moment, it was more difficult here to judge if all these elements really did fit in single moments. Elements didn't come so fast one after the other. There was no, or hardly any, overlap between elements. The pace was pretty deliberate—waltz rhythm. At first, I wondered if Ali was regressing in his understanding of the method. This was on the fifth day of training, and the second day of the switch to dDES. The first day of dDES seemed more precise than this. For the subsequent samples, I had Ali break up one of his reported moments

into two moments. He seemed displeased. He mentioned that he linked moments thematically, and that was why he understood various elements as comprising one moment. dDES generally determines moments by process rather than by content—if one strand can be separated from others, then it should be grouped as a separate moment.

There was no resolution to this question. Is Sequential grouped awareness a useful category or merely a quirk of how Ali chose to divide moments? It's possible that for Ali, certain experiential elements could not be divided into separate moments. They were too linked. Standard DES, itself, aims at investigating the "last undisturbed moment before the beep" (Hurlburt & Heavey, 2006, p. 15). But what does undisturbed mean? For Ali, by further dividing moments, I was interrupting them. The division of experiential moments may be arbitrary to begin with—at least with certain participants, and certain samples.

In any case, the concept of a moment is perhaps only useful insofar as to anchor the participant to as specific a slice of time as possible, in order to increase the accuracy of their reporting. Perhaps it doesn't matter how many 'actual moments' are reported, so long as they're reported accurately. Let's venture a hypothesis for Ali. Sampling days 3 and especially 4 marked the peak of a hypomanic phase. Experience came rapidly. Day 5 marked a transition away from this hypomanic phase. Experiential aspects came less rapidly but were still grouped together. Perhaps this grouping is still a result of the hypomanic phase—a sort of transition between 'normal' temporal experience and hypomanic temporal experience. This remains speculative.

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It's of note that not all samples during Ali's hypomanic period were of rapid experience. Some were the opposite—what he called "mind absent" moments. These were moments where very little attention was being paid to anything in particular. Here's one example:

> **Sample 4.1 M2**:
> Ali is listening to an audiobook. But he's not so attentive, either to the words or the meaning. Ali describes this moment as "mind-absent." This isn't badly remembered experience. The experience is notably more absent, and passive.

We can see that even in hypomanic phases, experience vacillates. Some samples involve rapid awareness and others involve sparse awareness. Perhaps one extreme gives way to another—energy to subsequent fatigue.

Kang (2015) also observed participants, like Jessica, who "vacillate between having complex and impoverished inner experience" (p. 141). Could this be the same phenomenon that we observe with Ali? If so, dDES presents a different way of looking at it.

In any case, we've seen that dDES could be useful for psychopathology. It can access experiential aspects that standard DES might miss—e.g. Rapid fluctuating awareness. We

cannot yet say if Rapid fluctuating awareness is a common feature of bipolar disorder. This is merely a case study outlining some possibilities.

We can compare to other research though. Phenomenological psychopathology has also found temporal acceleration in manic phases (Fuchs, 2010; Ghaemi, 2007), and there has been research linking such acceleration to neural changes (Northoff et al., 2018). Our findings here are an example of how the gaps between DES and phenomenological psychopathology can be bridged. And how, in the future, gaps between first- and third-person research might be bridged as well.

14. Discussion

Concerns for momentary experience

Before we get into our findings related to time, let's look at findings related to momentary experience. What can our sampling add to standard DES? First, a discussion of coding is in order.

Codes aren't entirely real. "A map is not the territory it represents" (Korzybski, 1933/1994, p. 58). Experience can't be fully reduced to the codes we use to describe it. But Korzybski's quote continues, "A map is not the territory it represents, but, if correct, it has a similar structure to the territory, which accounts for its usefulness." Codes can bear similarity to the phenomena they categorize. They can then be useful for drawing generalizations about a person's experience and for comparing various people's experience. In pursuit of utility, let's investigate some issues with coding.

Impressions and mixed codes

Many samples don't fit into a clear category. For example, we saw samples that mix image and thought. Others mix thought and feelings. Others mix images with feelings. Let's look at a tricky example that's hard to categorize.

> **Neža Sample 2.3**
> Neža is underlining words in a text, while thinking about where to meet a friend. At the moment of the beep she has a mental image of a restaurant (Mala Terasa) as a possible meeting place. Her image is of the restaurant in the summer (it's winter now). It's a still image and she sees tables, the floor, lights, sunlight, and buildings behind. The image is from a realistic perspective, as if she's there, and doesn't have borders.
> There's an impression along with this image that it's a cool place to meet, but she goes there a lot and maybe there are others. It's not separate from the image, and has no bodily location.
> Possibly also present in awareness: Neža is also underlining the text, thinking about where to stop underlining, what the text means, and that there's something wrong with the way it's written. She doesn't know of any words to this line of thinking. <u>Coding</u>: Image, impression(?), cognitive doing(?)

So here the image is combined with what Neža called a "feeling"—that the restaurant's a cool place to meet, but that she goes there a lot. It's not a separate element from the image. Does it really count as a "feeling" though? It's not an emotional experience. But it's not clearly articulated like a thought, and to Neža, the word "thought" didn't fit. Perhaps 'impression' works best as a code. This puts it in line with Sophie's Sample 2.3 with an impression of the void. Or Matej's Sample 3.3 with an impression of grayness, but no actual visual experience of grayness. Does it make sense for the code impression to unify these elements or are they disparate phenomena? The code impression isn't used in previous DES research. Neža's impression would most likely be grouped as unsymbolized thinking. However, I've found 'impression' to be a useful code in some circumstances.

In any case, this is to highlight that some samples can be tricky for coding. Certain elements of experience could blur boundaries between codes. Codes like 'imaged thought' and 'thought/feeling' can be useful in these cases. There's always the possibility that new codes could emerge if they're useful for certain samples or certain participants.

Cognitive doing

Most participants here had some degree of experience for which the code 'cognitive doing' was useful. This code isn't so common in DES research, although is sometimes used (Jones-Forrester, 2009, p. 412). It can designate a mental process that's ongoing at the time of the beep. For example, in Sample 3.3 Sophie is trying to form knowledge of Trump. This is more of a thought than a feeling. But at the moment of the beep, knowledge of Trump isn't present. Could we call this unsymbolized thinking? It doesn't quite fit. This moment is more about trying to think something, than of any thought actually being present.

In Sample 1.4 Max is trying to think of an argument to explain why embodied cognition is a useful paradigm. This sample is also more about trying to form a thought than of any particular thought being present.

In Sample 2.4 Sophie is concentrating, playing songs on Spotify, and looking at the descriptions to see if they match a song that she's hearing in her head.

All of these samples involve active processes—trying to form knowledge, come up with an argument, find a song. There's a cognitive component to these processes. Does it make sense to group all these phenomena together? They may be quite different. But for now, with these participants, I've found cognitive doing to be a useful code.

Another question is whether these elements would have become something different had the beep not occurred. For example, maybe Sophie would have formed a clear thought about Trump. Maybe Max would have formed a thought about embodiment. In Nora's Sample 2.3 she is trying to find a word to answer her friend. At this moment, there's no word present. But perhaps it would have emerged, if not for the beep. So is Cognitive doing really a useful code? Perhaps it merely designates interrupted processes. Perhaps there would have been inner speaking or unsymbolized thinking if not for the interruption.

This is a very real possibility, and all the more reason to bring in dDES to investigate the temporal component of experience. We see that it is indeed possible for phenomena like unsymbolized thinking to emerge gradually. So if interrupted, it may be possible for them to look quite different.

Volition

Another tricky area for coding is volition. Volitional aspects can often be part of experiential elements. For example, in Nina's Sample T1 she has a mental image of three children and intends to give them different colored coats. This intention—of wanting to give them different colors—could best count as volition. Volition can be part of other experiential elements, for example images or unsymbolized thinking.

Volition can also be its own element. For example, in Matej's Sample 3.3 M1 he has the intention to discard burnt butter in a pan he's using. In Clara's Sample 5.1 M2, she has the experience of needing to find a document. Volition in these cases involves intention or wanting. It's not quite an emotional experience, so the coding of 'feelings' is an uneasy fit.

Other DES researchers don't use volition as a code. However, it is used with microphenomenology (Depraz et al., 2017). The authors write, "volition appears as a relevant name for such a merging of emotion and cognition and a possible category solution" (p. 197). Their definition is broader than ours and includes elements that DES categorizes as feelings. Nonetheless, there is some overlap between our use of the term here and Depraz et al.'s use. Perhaps this category could be useful for future DES research.

It's also possible that dDES might be better suited than DES to investigating volitional elements. Clara at first didn't mention her experience of wanting to find a document in M2. Only when we discussed the M1 prior did Clara mention a thought about needing to find a document. When I asked what happened to this thought, she mentioned that it didn't go away, but stayed as a non-articulated element of her own experience in M2. So dDES potentially illuminated our understanding of Clara's momentary experience. Another possibility is that dDES distorted our understanding of the DES moment. We could have biased Clara to believing an element present that really wasn't. We can't conclude which of these options holds for any individual sample. I simply hope to offer the possibility that volition could be a useful code. It's up to other researchers to corroborate this or not.

Rich experience

Another topic of conversation concerns rich experience. We dealt with this in Chapter 9 with Adrien. Is our consciousness limited to a few elements at a time? Or does it include a great number of elements in its periphery—simultaneous feeling in your right big toe, the sound of a dog barking nearby, the sight of cars going by, wind against your face? Do you always, for example, have some kind of visual experience? Or does visual experience come and go in your direct awareness. Your eyeballs might be pointed at the glum people across from you on your subway morning commute, but they're not always in your direct awareness. Hurlburt believes that for most people, consciousness is more on the limited side.

Schwitzgebel is not so sure and inclines towards the rich view (Hurlburt & Schwitzgebel, 2007, 2011a).

However, Hurlburt also argues that DES doesn't pursue the excessively faint and hard to detect. Getting caught up in these details could introduce confabulated or distorted aspects into findings. So it's theoretically possible that multiple elements of 'rich experience' are present at every sampled moment.

Discussions of rich experience could be important. Schwitzgebel writes, "If the rich view is correct, then consciousness is very abundant. That should have a big impact on any general theory of consciousness – on any theory of the functional role of consciousness and of the kinds of brain structures in which it's instantiated" (p. 236).

How does this tie into our findings? Multiple samples did indeed involve elements that I wasn't entirely sure were present or not. Often this involved aspects of perception—Nina in Sample 2.2 seeing her computer and backpack, or Clara Sample 2.5 seeing a plate she's washing. I wasn't entirely sure if these elements were in either participant's direct awareness. Clara estimated that the plate element took up 10% of her awareness. Nina gave the same percentage for seeing her computer and backpack.

If these elements were present in awareness, then they could be coded as perceptual awareness. This is different from our coding of sensory awareness. Sensory awareness refers to noticing a specific sensory aspect. Think of Max noticing the weird taste of tomato sauce and mouthwash mixing. Or our example of noticing how light shines off the brown fuzz of a kiwi. Perceptual awareness is milder. It concerns perceptual aspects in experience, without any direct focus on these aspects.

DES doesn't actually make much of perceptual awareness. Sometimes it's coded (Jones-Forrester, 2009). In much of the research, it's not mentioned. It lies within the margin of error of DES, and of dDES too for that matter. But that doesn't mean it's not an important part of temporal experience. Is perceptual awareness something that carries over across 'moments,' providing common ground while other elements shift in and out? For example, take Matej's Sample 5.2. In M1 he's innerly speaking the word "aaand" and in M2 he's pressing his phone, feeling pressure and coldness. But in both moments, he's also seeing his phone display. This seeing counts as perceptual awareness. Since it overlaps in both moments, the temporal dynamics could be coded as Overlapping. But since perceptual awareness lies in dDES's margin of error, we can't be entirely sure of this temporal dynamic. For example, would experience be more like figure 39, with perceptual awareness, or like figure 40, without? How do we resolve this uncertainty? There's no easy way. DES and dDES researchers must remain stringent in separating context and presupposition from direct experience. The only solution I can think of is retaining humility in sample descriptions—words like "maybe" and "perhaps" are useful. They're the DES equivalent of the statistician's confidence intervals.

We must remain open to the possibility that there are elements of experience that DES and dDES miss. Sometimes we might only notice these elements of 'rich experience' if they alter in some way. For example, in Sample 5.6 M1 Adrien has the word "enterrer" linger in his head and push out "parasites" of thought that occupy a small portion of his awareness. Adrien estimated that these parasites of thought occupied only 5% of his experience. Might they be present in other samples? Perhaps they're only noticed here because the lingering word pushes them out of experience, making their absence noted. It's certainly a possibility.
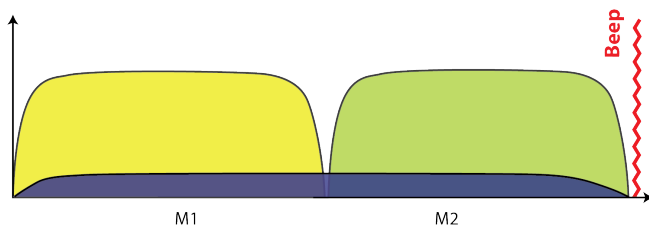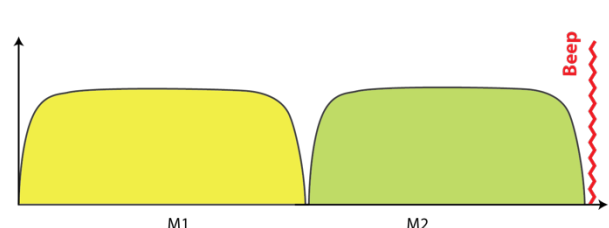
Fig. 39. With perceptual awareness

Fig. 40. Without

So in sum, what are we to make of this discussion of rich experience? I think there may be one or a few more elements in awareness than are reported by DES or dDES for any one sample. However, I find it unlikely that all possible elements of awareness, however slight, are experienced. I don't think we always have experience of our right big toe. I don't even think we always have visual experience. However, since DES cannot conclusively investigate the excessively faint or hard to detect, it's impossible to say for sure. In continuing to do careful research, we must remain open to any possibilities.

Scrolling

A phenomenon that ties into conversations of rich experience is experience of scrolling. Quite a few samples involve scrolling on social media or other websites. For example:

> **Max Sample 5.2 M2**
> Max is on his phone looking at an Instagram story. He's seeing an image of a guy's face looking upwards. It isn't so present in experience though. His experience is "shallow" and "not deep." Max didn't think anything else was present. <u>Coding</u>: Scrolling

Max is looking at an Instagram story and seeing a guy's face. But he's not so much paying attention to sensory aspects. And seeing the face isn't even so present in experience. Adrien had a similar sample:

Adrien Sample 1.3

Adrien hears the word "great" from a song. He's not really paying attention to it.

He's also looking at a picture on his phone (he doesn't remember any aspects, besides there being two people). However, nothing is so prominent in his experience. He describes this moment in turn as "passive," "zoned out," and like a "zombie." He says it wasn't just badly remembered experience. The experience was notably passive. <u>Coding</u>: Perceptual awareness, scrolling

What do samples like this say about experience? Do they confirm all those fearful op-eds that smartphones are turning us into mindless zombies? It's not our role here to do such editorializing, though feel free if you'd like. What's interesting is that in our interactions with technology, new categories of experience might emerge. 'Scrolling' may be one such category. It could be a useful code across participants.

Hurlburt and Krumm (2020b) also observe this phenomenon. In their continued sampling, they're seeing an increasing number of samples of people scrolling online. They note that it seems to 'relax' the richness of experience. Adrien was, for instance, "zoned out." Max described his experience as "shallow." Even elements that are in experience are not so prominent. Perhaps experience in these moments is not rich. So to return to our discussion of rich experience, perhaps it doesn't make sense to draw generalizations of how rich our experience is. This richness could change according to our activity.

Absence or presence

For the last topic concerning momentary experience, let's dip into the waters of paradox. Often experiential elements raise the question: was there really experience or just absence of experience? For example:

Jelka Sample 2.3

Jelka has a feeling of relief. She describes it as an absence of pressure that she was experiencing before. That pressure occupied her "whole body." This current moment is experienced as a relief from that pressure. <u>Coding</u>: Feeling

Is Jelka really feeling relief here? It would seem that way. But in describing this experience, she describes it solely in terms of the feeling of pressure before. Is the relief feeling just the absence of the previous feeling? Can the absence of a feeling itself be a feeling?

Let's bring in some other examples. In Sample 2.3 Anna is looking at a photo and feels antipathy towards the person. But this feeling is possibly just the absence of feeling. In Sample 2.5 Ali feels in a down mood. He describes this as the absence of any joy or happiness. But is this absence of feeling itself a feeling? To this question, Ali confidently answered "yes."

Although perhaps we need to understand temporal experience in order to understand such feelings. For example, Jelka's feeling of relief in Sample 2.3 may require us to understand the moment before the sampled moment. She was feeling pressure before she experi-

enced the absence of this pressure. And the absence characterized relief. So by solely looking at momentary experience we run into paradox—the absence of feeling as a feeling. But by looking at temporal experience, this paradox can be resolved.[36]

We see something similar in Adrien's Sample 5.6 where the word "enterrer" pushes out "parasites of thought" leaving silence. This silence is directly experienced. It makes the moment (M2) experientially different. But perhaps this difference can only be understood in terms of what came before. We need to understand the parasites of thought to understand the silence that results from their absence.

In another sample, T1.2, Adrien experiences "nothingness" taking up a chunk of his experience—roughly 85%. Two elements take up about 15% of his experience, but the rest is composed of nothingness. Does this even make sense? Shouldn't we just take the 15% that *was* in his experience to be his entire consciousness at the time? To Adrien, no. The empty 85% was an important aspect of his experience.

So nothingness can be directly experienced. And absence of feeling can itself be a feeling. These findings are strange, and they flirt with paradox. It may be too early to say anything definitive about these samples. But we should remain open to such possibilities in experience. And we should remain open to experience having its own logic that diverges from our presuppositions.

And they may, in fact, only differ from the presuppositions of Western thought and philosophy. Many eastern philosophical perspectives are better equipped to deal with phenomena like nothingness in experience (Baggini, 2018). For example, most Buddhist teachings heavily focus on Sūnyatā or emptiness. The Kyoto philosophical school in Japan is likewise centered around a study of nothingness (Nishitani 1991). Here, even regarding terminology, nothingness is not just a negation of being—'no thing'—but an entity in itself—'*mu*'. Baggini writes that nothingness can have a presence in much Asian philosophy. This can even affect cultural outlook and perception. According to Baggini, when looking at a line drawing of a circle, Japanese viewers consider as much the empty space within the circle outline as they do the outline (studies like Musada & Nisbett, 2001, and Chua et al., 2005, provide evidence for Chinese and Japanese viewers focusing more than Americans on negative space and background). Emptiness as having presence may not be such a paradox. Western philosophy dominates academia but may be ill-equipped to help us understand certain intricacies of experience. Non-western philosophy can help fill the gaps in our knowledge.

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[36] Although it's still a possibility that our participants were mistaken and generalized about their experience rather than hewing to specific moments.

Concerns for temporal experience

What is a moment?

dDES can help us figure out what exactly a moment is. Is an experiential moment an actual thing? Or is it a useful fiction to render descriptions more specific? Since DES relies exclusively on 'the moment before the beep,' it's important to examine what this actually means in terms of experience.

dDES shows that sometimes there are firm boundaries between moments. Sometimes there are clear interruptions from one moment to the next. But sometimes, there's more of a gradual transformation between moments. Or experience in M1 can fade out while experience in M2 fades in. And sometimes—as is the case with Adrien's sample T2.2—experience can't be divided into separate moments at all. This sample involves one long moment, lasting 5-10 seconds by Adrien's estimate. In fact, for 18% of Max's samples, he didn't know how to divide experience before the beep into separate moments. For some of these samples, memory problems may have hindered him. For other samples, experience itself may have been different in a way that made it hard to neatly divided. For example, Max described experience in Sample 3.2 as "stretched-out." This stretched-out quality made it hard to further subdivide experience.

Moments can also be of different sizes. For Adrien's Sample 4.2, M1 felt much shorter than M2. Adrien estimated M2 as a bit less than a second. M1 felt like half or one-third of that. Note that this doesn't say anything about how long these moments would have taken if you used our Phenomotron3000 to hook our subject's neural activity to a loudspeaker and timed it. Only that these moments seemed to be of these variable lengths. In Sample 5.4, Adrien also described M2 as three times longer than M1. In Sample T2.1 Adrien described M2 as "very very very tiny," maybe "a millisecond." Other participants had moments of different sizes. But Adrien's samples were the clearest for showing this variability.

Experiential shifts may, at times, be determined by outside stimuli. In Sample 4.5, Adrien's separation of moments was in sync with the rhythms of a song he was listening to. We've seen that our inner experience may structure the perception of outside stimuli (Fodor & Bever, 1965), but it's also possible that outside stimuli structure our inner experience, even determining the outlines of experiential moments.

We also saw examples of a temporal dynamic we termed a Grace note. This involves experience between M1 and M2 that's too short to count as its own moment. For example, in Sample 4.5 Adrien has an extremely short intermediary thought: why am I on my phone? Matej, in Sample 3.2, has a very short intermediary thought of uncertainty over whether "dephosphorylation" is spelled with an i or a y. Could we have counted these 'Grace notes' as separate moments? Theoretically, yes. The interview could have asked the participants to further divide their experience. But let's return to our original question.

Are experiential moments real or not? dDES and DES don't take a stance, but in the context of the method, treat moments as a 'useful fiction. Sometimes this fiction can be quite appropriate for finding clear boundaries within experience. Sometimes the reality of experience surpasses this fiction. Experience doesn't (always) divide neatly. dDES makes it clear that participants are free to buck the suggestion of neatly divided moments. This is merely a heuristic for eliciting greater precision in reports. Once it's not useful, it can be discarded, like training wheels once someone's learned how to ride a bike.

But as mentioned in the introduction, there is a body of research arguing that we really do segregate consciousness into moments of around 2-3 seconds (Pöppel, 1989, 1997; Wittman, 2015; Montemayor & Wittman, 2014; Kent & Wittmann, 2021). This is probably roughly the length of the average dDES moment or DES moment. Might this indicate that there's some neural reality to the subdivision of experience?

First, what exactly is meant by an experienced moment? We are conscious on scales shorter than 3 seconds, so this 3-second interval may at first seem arbitrary. Already at ranges of 30msec, we recognize events as successive instead of simultaneous (Pöppel, 1989). But at scales of around 3 seconds, supposedly a new kind of processing occurs. We integrate a range of perceptual information to form a subjective experience of a moment. For example, think of the Beatles song "Hey Jude." We don't just hear "hey" and "Jude" as separate entities but hear the whole phrase as a unified whole (Lloyd, 2012). This is called the "subjective present" (Pöppel, 1989, 1997) or "experienced moment" (Wittman, 2015).

Proponents of this theory bring up a variety of psychophysical data. Our perception of the Necker cube illusion shifts roughly every three seconds (Pöppel, 1997). Every three seconds, the back of the cube becomes the front, and the front becomes the back. Presumably, a new subjective present entails a new response to the stimulus. Similar durations qualify for how we group beats of a metronome (London, 2002), optimally synchronize motor actions to stimuli (Mates et al., 1994), reproduce durations (Kagerer et al., 2002), or most sensitively respond to a deviant stimulus in a sequence (Wang et al., 2016), among a range of other examples. So when information falls within roughly three seconds, we group it as a perceptual whole. When stimuli occur after this period, we are less capable of reproducing them or grouping them. It's then argued that this three-second period corresponds to our experience of a conscious now.

But other research complicates this, for example from White (2017). He reinterprets the data presented by Pöppel (1989, 1997), Wittman (2015), and others, and presents more data from the same paradigms. White concedes that some psychophysics experiments do show groupings of around 3 seconds. But this is only when one cherrypicks data. Other studies and paradigms show different averages. For example, the average for perceptual switch with the Necker cube illusion is about 5 s. The upper limits of sensitivity to the Mismatch Negativity paradigm (responding to a deviant stimulus in a sequence) is 12 s

(Sams et al., 1993), far beyond the range given by proponents of the conscious present. To White, there is nothing privileging a 3-second range of momentary experience. And even if all psychophysical evidence converged on 3 seconds, this wouldn't mean that our conscious momentary experience spans 3 seconds. Different modalities might integrate piecemeal, not in lockstep. For example, visual information might integrate at a different time than auditory information, conceptual information, etc. Our view of the Necker cube might fall on one 'beat' while our grouping of the speech patterns of the lab assistant talking to us falls on another 'beat.' To White, integration depends on density of information, rather than specific time spans. Integration happens not within one span, but within multiple windows, starting on the millisecond time scale and stretching out to the level of narrative on a time scale measuring perhaps hundreds of seconds.

But the strange thing about this debate is that even though it is about subjective experience, it doesn't involve phenomenological data (besides naïve armchair introspection). This is a serious oversight. Perhaps if we were only talking about information processing in the brain, we could get away with this. Our brains might integrate information in certain ranges without this necessarily corresponding to shifts in subjective experience. But the discussion is about *subjective experience*—the "subjective present" (Pöppel, 1989, 1997) or "experienced moment" (Wittman, 2015). If we're going to talk about conscious experience, let's bring in some actual phenomenological data. What can DES or dDES add to this debate?

Well if you look at traditional DES, it does at first seem to support the 3-second view. Reported moments can be variable, some seeming like fractions of a second, others seeming quite long. But on average, 2-3 seconds seems apt for most DES moments (again, we can't be entirely sure, because there's no way yet to measure the length of a DES moment). With dDES too, we see variability. Sometimes moments can seem like fractions of seconds (Adrien Sample T2.1). Sometimes they can seem longer, possibly 10 seconds (Adrien Sample T2.2). But many do seem to fall in the 2-3 seconds range.

Still, let's not become overconfident. Many transitions are not clear-cut. For 18% of samples, Max didn't know how to separate moments. Sample 3.2, for instance, had a "stretched-out" quality. Some transitions better support a theory of segmented moments than others—for example, Switching, where experience in one moment transitions abruptly to different experience in the next. But transitions like Transformation are not clear. There is no sharp dividing line between moments in these instances. Experience gradually alters. Picking out 'experienced moments' in these cases can seem arbitrary. Transitions like Overlapping also present complications. In these cases, one element of experience extends while other elements may come and go. This could support White's theory that integration can happen at different times for different modalities. Indeed, in many samples we observe modalities altering piecemeal. A mental image might transform while an aspect of sensory awareness stays constant (Max Sample 2.3, for instance).

Also, it's important to note how variable experience can be between participants. Nora had frequent Switching, taking up 50% of her transitions. The 'experienced moment' hypothesis might hold for her. But participants like Faith and Matej had sparse Switching (10% and 14% respectively). Max had a degree of Overlapping almost 5 times higher than other participants on the lower end. Research on the 'experienced present' hasn't emphasized the importance of individual variation.

Experimental psychology and dDES have different intentions. Experimental psychology seeks averages, while dDES often highlights the idiographic nature of experience. It may be that when considering averages, temporal integration on the scale of a few seconds is still compelling. So our research doesn't quite overturn the hypothesis of the "subjective present." But it at least complicates it. Experienced moments can be much shorter than the several-second range, or much longer. Experience doesn't always divide neatly. Modalities can alter piecemeal. Individuals can differ drastically. At the very least it's clear that phenomenological investigation must be an integral part of this continuing debate.

Idiographic dynamics

We've seen some codes for common temporal dynamics. Let's reiterate them in order of decreasing magnitude. Keep in mind that this omits the codes Emerging and Disappearing, which are common, but are broader catch-all categories.

Transition	Percentage of total transitions (%)
Overlapping	25
Switching	21
Cross-fade	8
Transformation	8
Focusing/Unfocusing	5
Buffer	3
Rapid fluctuating awareness	3
Interruption	2
Grace note	2

So from this, we get a picture of common temporal dynamics. Overlapping and Switching top our list. But we must also keep in mind that differences between people can be vast.

47% of Max's transitions were Overlapping. Contrast this to the total of 25% for all participants. Max frequently had at least one element of experience carry over across M1 and M2. Often this was an element of sensory awareness. For example, in Sample 2.2 Max was tasting the strange clash of tomato sauce and mint in both M1 and M2.

50% of Nora's transitions were Switching. Contrast this to the total of 21% for all participants. Nora's experience often switched directly and brusquely from one experience in M1 to a new one in M2. For example, in Sample 5.3 she had a direct switch from wondering if she should buy a pot in M1 to wondering if her friend could lend her a mattress in M2. There wasn't any gradual fading out or fading in of these elements.

So we see that temporal experience is ideographic. Each participant has a different way that their experience changes over time. Take Matej for instance. Matej had highly localized elements—inner speaking, inner hearing, feelings, or sensory awareness. These locations could shift and transform from one moment to the next. In Sample 4.2, inner speaking shrunk to a small bubble shape and disappeared. In Sample 4.3 M1, a frozen sensation moved across Matej's forehead. In M2, he had a cold, clear feeling, left in the wake of the frozen sensation. So Matej's unique temporal experience relates to the unique characteristics brought forth by standard DES.

Variations in temporal experience may be useful for psychopathology. For example, we saw that Ali had Rapid fluctuating awareness. New elements entered rapidly. They could come one after the other, or overlap with each other. In Sample 4.3 M2 Ali very rapidly experienced: taking a sip of coffee, noticing the bitterness, noticing the lack of sweetness, noticing a dog and person on the balcony across, thinking that the person he was texting was nice, innerly speaking "that made me smile," and thinking that his acquaintance was giving good vibes. These elements overlapped somewhat. They all came in a rapid trill. So even if one quibbled that these elements don't really all belong in one moment and they're just short separate moments—that still wouldn't deny the reality that elements came rapidly.

Rapid fluctuating awareness was a useful code for Ali. Could it be useful for other participants with bipolar disorder? Impossible to say without a further study. But it's an intriguing possibility.

Another finding regards Adrien's permanent vs temporary transitions. At one point, Adrien noted, "I feel like some thoughts I can keep without having them in experience. And some I don't. And when I leave them, they're left to be forgotten." Of course, this is a generalization and we should be wary. But sampling did back it up. For example, in Sample 4.2 M1 Adrien was having an imaginary conversation with his PhD supervisor. In M2 he was reading. But there was a "smooth jump" to the reading. It didn't feel like the imaginary conversation was over. It felt like he could return to it and nothing would be lost. No

other participants had this phenomenon of permanent vs temporary transitions. I'm not aware of any similar phenomenon described in the phenomenology literature.

Another finding that I haven't encountered elsewhere regards elements increasing in awareness without increasing in intensity. We saw this with Sophie and Nora. Both had feelings become more prominent in awareness without it making sense to say that they increased. For example, in Sample 5.2 Sophie was reading a book when a positive feeling entered awareness. To Sophie, it didn't make sense to say it increased. She described it as a dashed line becoming solid. Nora also used this same description (but reversed) of a solid line becoming dashed. So we can infer these to be instances of the same phenomenon. We can code it as Focusing/Unfocusing.[37] We can also relate it to a phenomenon from DES research—feeling-fact-of-body (e.g. Hurlburt & Heavey, 2006, p. 222). With this phenomenon, emotion can be an ongoing process without being directly experienced. Perhaps with the code Focusing/Unfocusing, we can see how feeling-fact-of body can enter or leave awareness. It doesn't necessarily alter in intensity. What alters is its presence in awareness.

Findings like this call to mind the role of the unconscious or subconscious. Other findings also hint in this direction. In Adrien's Sample 4.1, a sensory aspect (finding balance) entered awareness without seeming like it came from nowhere. It felt like it had already been growing before it entered in awareness. Taken together with Adrien's "smooth jumps" and with Focusing/Unfocusing, we can see how unconscious and conscious processing wrap around each other. Elements can potentially grow before entering awareness, stay at stable intensity without being in direct awareness, or continue in parallel outside of direct awareness. Mind you, we can't look directly at the unconscious. Examining it is more like examining an object by looking at its shadow. From a strict perspective, DES and dDES remain agnostic about whether or not unconscious processing even exists. Such agnosticism is useful for collecting data. But once data is collected, we can permit ourselves to theorize.

We can compare our findings to standard DES findings hinting at the interplay of the conscious and subconscious. For example, the guitar virtuoso Cobo had multiple autonomous strands of experience rising and falling independently in and out of consciousness (Hurlburt, 2011a, p. 263). Perhaps for Cobo there is some threshold of intensity at which an element becomes conscious or unconscious.

DES and dDES can show the contours where the conscious and unconscious intermingle, like a river delta meeting a sea—a shift in color where freshwater meets saltwater. The unconscious is mysterious, and hard to glimpse with introspective methods. By definition, it eludes them. But we can catch a glimpse from how it meets consciousness. Even

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[37] You might wonder, why not code it using the participants' terminology—"Solidifying" for instance. This is indeed a possibility, and one that I'll adopt in future research if other participants use the same description. For now, the metaphor of Focusing proves useful. Often participants use different metaphors to describe the same phenomenon (Hurlburt, 1993).

Freud acknowledged this, writing about the unconscious that it "is of course only as something conscious that we know anything of it, after it has undergone transformation or translation into something conscious" (1915/1963, p. 116).

Explicit time and altered consciousness

Most of our findings relate to implicit time. But a few samples do relate to explicit time. So there are occasions when participants are directly aware of time or duration.

For example, in Matej's Sample T2.2 he was feeling the speed of the Libet task (which we'll see in the next chapter). He described this like being in a video game car race and accelerating suddenly at the start. But this description was more than metaphorical. It was that exact feeling. Matej experienced time and speed through the spatial experience of accelerating. There's a good deal of research dealing with the connection of time and space (Núñez & Cooperrider, 2013; Boroditsky & Ramscar, 2002; Kraus et al., 2015). The two are processed in similar parts of our brain, discussed with similar language, and conceptualized with common metaphors. It's interesting that in one of the few DES samples where time perception is direct, space is also involved.

Another instance of explicit time is Ali's Sample 2.4. Ali is high from cannabis and has the impression that time is passing slowly. Also, his vision is altered. It's discrete—one still image after the next—rather than continuous. This alteration of vision may relate to the alteration of temporality (but this is uncertain). The slow passage of time when high is in line with other studies (e.g. Tinkleberg et al. 1976). But Ali's sample is an example of explicit time passing slower. Is implicit time altered and slowed as well? Or is slow passage only evoked when a participant reflects back on their experience? Further research would be needed. But it's interesting that explicit time in this sample so directly correlates to existing research.

While on the subject of altered consciousness, we have a sample from Max under the effect of psilocybin. Max is listening to the song *Brain Damage* by Pink Floyd and seeing a nebular galaxy rotate at the speed of the guitar rotary effect from the song. He also sees light shoot out of the galaxy in sync with background vocals. From the perspective of temporality, it's interesting that the galaxy is rotating at the same speed as the song's guitar effect. There is connection across modalities. The visual and the auditory are intertwined. Cross-modal connectivity is my tentative hypothesis on one of the experiential effects of psychedelics like psilocybin (supported by some of my own DES samples as well). This would be in line with neuroscientific findings showing increased connectivity between regions (Roseman et al., 2014). But like with findings on explicit time, more samples would be needed for any definitive conclusions. Here we can merely highlight interesting possibilities and avenues for future research.

Comparison with micro-phenomenology

How do our findings relate to findings from micro-phenomenology? We can compare our categories for temporal experience to categories found by Depraz and colleagues (2017). Recall, these include:

Mapping — inner activities appear while previous ones are still fully present

Overlapping — inner activities appear while previous ones are still present, and continue after the disappearance of the latter

Transformation — experience belonging to one category flows into a different experience belonging to another category

Ongoing processes — inner activities last throughout a phase, and can reappear even though they sometimes go unnoticed

Converging processes — two or more different kinds inner activities merge into a single one

Diverging processes — experience splits into two or more inner activities (p. 198).

How do these stack up to dDES findings? Although we didn't code for it specifically, dDES did find Mapping. Instances of the codes Emerging or Overlapping could fit. With dDES Overlapping, new elements of experience can appear while previous ones are fully present, just as in the description of Mapping.

Our coding of Overlapping is somewhat different from Depraz et al.'s (2017). Ours refers to experience spreading across moments. Our coding of Cross-fade would be an instance of Depraz et al.'s Overlapping. With Cross-fades an element appears while a previous one is present, and continues after the disappearance of the latter—as in the description of Overlapping. But with Cross-fades, this overlap is generally very short, and perhaps not what Depraz and colleagues have in mind. Their coding of Overlapping might require looking at a broader scale than dDES does.

We did find instances of Transformation. Experience in M1 could transform into a different experience in M2 with continuity between these components.

Also, Ongoing processes could relate to our coding of Focusing/Unfocusing. With the latter, feelings can increase in awareness without increasing in intensity. Presumably, these are ongoing emotional processes that can come and go in awareness. So Depraz et al.'s (2017) category of Ongoing processes looks at a wider scale than dDES. Nonetheless, we can extrapolate from dDES to infer broader patterns such as these. Not all instances of Ongoing process would necessarily count as Focusing/Unfocusing. But could all instances of Focusing/Unfocusing count as Ongoing processes? It's possible.

dDES did find instances of Converging processes and Diverging processes. But these were rare and uncertain. Two elements of awareness could merge into one. Or one element

of awareness could separate two other elements. These didn't become firm codes since there was only one instance of each, and the samples weren't so clear.

dDES did find aspects not found using micro-phenomenology. Micro-phenomenology (at least as conducted by Depraz et al.) did not find Switching—one element of awareness switching suddenly to the next. It did not find Interruption—one element brusquely interrupting the previous element. It did not specifically find Cross-fading—one element fading out while another fades in—although some instances of Overlapping might count. It did not specifically find Focusing/Unfocusing—although some instances of Ongoing processes might count. It did not find Grace notes of experience or Rapid fluctuating awareness. It did not find Buffers in experience where little or no experience is present. In fact, no micro-phenomenology study has dealt with gaps in experience without consciousness. This is one major difference between DES/dDES and micro-phenomenology. Perhaps a very small temporal window is needed in order to observe these phenomena. Memory might fill in these gaps as soon as they occur, necessitating that they be apprehended *in media res*.

Depraz's and colleagues (2017) found other categories not yet mentioned—Triggering micro-mechanisms, Circular mechanisms, and Cascade processes. We didn't find these. Perhaps DES is not the right time scale to investigate them. Perhaps they're artifacts of micro-phenomenology data collection and analysis.

There is some overlap between dDES and micro-phenomenology findings. But they're still quite different. Depraz et al. found a number of categories that we didn't. We found a number of categories that Depraz et al. didn't. Most likely, different temporal scales give different results.

The continuity thesis

Our findings go against certain presuppositions in phenomenology, for example the continuity thesis. According to this view, there are no gaps in consciousness. There are no blank spaces without experience. Dainton, for instance, argues for this given his own phenomenological data. He writes, "My thinking is often scrappy and inchoate, but it takes place in the context of a relatively constant and continuous mass of peripheral experience, bodily, emotional and perceptual, which together constitute the phenomenal background" (2000, pp. 118-119).

He's responding to Strawson arguing for discontinuity. Strawson writes, "When I am alone and thinking I find that my fundamental experience of consciousness is one of repeated returns into consciousness from a state of complete if momentary unconsciousness. […] The situation is best described, it seems to me, by saying that consciousness is continually *restarting*" (1997, p. 422). Both Strawson and Dainton extrapolate from their data to generalize for all experience. For Dainton, all consciousness is continuous—always. For Strawson, all consciousness is disjunct, constantly "banging out of nothingness" (p. 422).

Which view do our findings support? Neither. First off, it is counter to our method to generalize from one participant's experience to all experience (especially not from the researcher's experience). It's entirely possible that Strawson's experience is a disjunct "series of comings to" (p. 422). That doesn't mean all experience is like this. It's possible that Dainton's consciousness is continuous. That doesn't mean the same holds for everyone.

From our dDES sampling, we did find instances of disjunction in consciousness, in 3 samples. In these samples, there were spaces between M1 and M2 with no experience (although to be rigorous, we also admit the possibility of slight experience or unremembered experience). For example, in Max's Sample 4.1, in M1 he was sliding his hand up his guitar fretboard and in M2 he was experiencing the decay of a guitar note. But the actual playing of the note was not in his experience.

The possibility of times with no conscious experience is in line with standard DES as well. For example, in one sample Ben was without thought, an experience he described as like having a "void within" (Hurlburt 1990, p. 93). In another sample, at the moment of the beep, nothing was in Peter's experience—it was "completely blank." (Raymond, 2011, p. 239). With dDES, we found blank space of no experience between two moments. Standard DES found blank space of no experience at the moment of the beep. Perhaps these are two ways of looking at the same phenomenon.

But what can we conclude in terms of Strawson and Dainton's views? Contrary to Dainton's view, consciousness isn't always continuous. There can be moments without consciousness, moments of 'blankness.' But is this the experience of absence or the absence of experience? Are participants *experiencing* blankness, or simply absent of experience? With some samples at least, it seems the latter. There's nothing in conscious awareness at the time of the beep, or between beeps. Of course, DES and dDES can't be completely certain of this. We must admit the possibility of slight experience or unremembered experience. But we at least can establish the *very real possibility* that people can, at times, be absent of experience. Dainton uses the continuity thesis as a priori justification for his theories of consciousness (2000, 2010). This is unsubstantiated.

But that doesn't mean that Strawson is vindicated. Is consciousness constantly 'restarting'? No, not going by DES and dDES samples. Is consciousness a "series of radically disjunct irruptions into consciousness from a basic substrate of non-consciousness" (p.422)? Not at all. Participants did not have a basic state of unconsciousness from which consciousness continuously entered and disappeared. For dDES, buffers of time without consciousness were found in only 3% of samples. DES samples of absent experience aren't so common either. For some people, they're more common, for some less. The highest percentage I've come across is with Sue, who in 8% of samples, "was not thinking about anything, even when the word 'thinking' is used in its broadest sense" to designate any "mental experience" (Hurlburt, 1990, p. 139). So in 8% of samples, Sue had either no experience

or very slight experience. This is a far cry from Strawson's portrayal of experience as constantly emerging from a substrate of non-consciousness. For Strawson, we are mostly unconscious with little pointillist flecks of consciousness thrown in. What dDES and DES find is that we are mostly conscious, with occasional gaps and lapses of non-consciousness.

Of course, as we stated, Strawson's own consciousness might be exactly as he describes. The same for Dainton. But even if this is the case, one can't generalize from one's own experience to the experience of any other individual, much less generalize to consciousness as a whole. The kind of armchair introspection performed by Strawson and Dainton involves judgments on experience where one person chooses "the target, the occasion, the duration, the introspection, the interpretation, and the generalization […] generally on the basis of an implicit or explicit theory" (Hurlburt & Schwitzgebel, 2011, p. 259). This is not optimal for research.

Experience logic

Schwitzgebel reacts with incredulity that inner experience can run counter our understanding of physical reality. This is concerning experience where Melanie is hearing repetitions of her inner speaking "nice long time." These repetitions come quickly one after the other. Each iteration is nearly instantaneous. But it doesn't seem like the phrase is sped up. Schwitzgebel writes, "It seems to me that it can't *literally* seem both that it's repeating multiple times, one after the other, and that it's instantaneous" (Hurlburt & Schwitzgebel, 2007, p. 210). Can something really be temporally extended and instantaneous?

In experience, yes, it seems. Experience has its own logic, not too far from dream logic. Adrien had two instances (Samples 5.5 and 5.6) where a phrase was contained at every instant, extending through time. He used a metaphor of the afterburn of sun in your retina. This is similar to Melanie's instance of repetitions coming nearly immediately but not feeling sped up.

By the phenomenological reduction, we can't assume we know anything about the physical world from subjective reports. And we can't assume we know anything about subjectivity from our understanding of the physical world. The realm of consciousness might be quite different from our assumptions about any physical reality.

Take another example regarding causality. In experience, it might be possible to have causality without temporality. This was present in two samples. In Matej's Sample 1.3, he innerly hears "we crossed out" [in Slovenian] and this causes calmness, experienced as a tickling in an oval region. So there's casaulity, but Matej notes that "the causality wasn't temporal." In Ali's Sample 1.3, he feels bloated, and this bloated feeling causes guilt—of eating too much. But both these elements come at the same time. It's too early to draw definitive conclusions from these samples. After all, they were both on the first sampling day,

before participants had much training. But causality without temporality remains a possibility in experience.

The realm of experience may be a foamy, shifty netherworld with new rules. Temporal extension without time. Causality without time. Images without visual properties. Hearing without auditory properties. We must remain open to new sights in the virgin jungles of experience.

<center>❊❊❊</center>

We've covered a lot of ground. We've seen that experience doesn't need to hew to our understanding of physical reality.

We've seen that experience can buck phenomenological presuppositions—for example that our consciousness is an undivided stream.

We've seen that often we're merely conscious *in* time, but sometimes we can be conscious *of* time. This explicit time consciousness can be related to our experience of space. And it can be altered by drugs.

We've seen that dividing experience into individual 'moments' can be arbitrary. Sometimes experience divides neatly, sometimes it doesn't. But this subdivision can be a useful tool for reaching greater specificity in experience reports.

We've seen that temporal dynamics of experience can be grouped into various codes—Overlapping, Switching, Cross-fading etc. People can have very different proportions of these dynamics.

We've seen that experience can be idiosyncratic. For Sophie and Nora, elements can become more present without increasing. For Adrien, transitions between elements can sometimes seem temporary, and at other times permanent. For Max, sensory elements can extend across multiple moments. For Matej, experience can consist of highly localized elements that shift over time. For Ali, experience can rush rapidly from one element to the next.

If there's one takeaway from the data and analysis we've presented, it's that we're unique. And so we can cross off the first line of our haiku.

Each person unique
Different scale, different results
New models needed

Unique. That word's so worn that it can sound trite. As kids, we're told that we're special snowflakes, but then we grow disillusioned. We fit ourselves and others into groups. We conform. Humans are "tribal" we're told—e.g. popular books like *Tribes* (Godin, 2008) and *Tribal Leadership* (Logan et al., 2008). But if there's anything to learn from DES and dDES, it's that we remain unique, even in something as fundamental as our temporal consciousness. Perhaps conformity is propelled by shared language, signs, and signifiers. We

can wear similar clothes and adopt similar ways of talking. But there's no way to stabilize and calibrate our inner lives. So our patterns of thinking remain unique—variegated and multifaceted. Of course, we know that other people have thoughts that differ from ours. But we seldom realize that not only the *contents* of these thoughts, but also the *process* of how they appear can differ. The way our consciousness extends over time and jumps, fades, transforms, or disappears from one moment to the next can differ. Even when on the outside we may look like a school of fish, swerving in the same direction, if you look at our consciousness, we're more like bright tropical fish of all shapes and sizes flitting around the coral.

Part III. Connections

15. A free will experiment

This following chapter was written in collaboration with Lucas Jeay-Bizot who was instrumental in formulating the experimental design, coordinating the task, analyzing the data, and drafting the original report. In this study, we'll use dDES with an experiment investigating 'free will.' This is a canonical study from Libet and colleagues (1983). Participants choose when they want to move a finger and note the time of decision. Libet et al. found brain activity preceding this intention to move. They infer from this that we have neural firing—a 'readiness potential'—before our decisions. We don't, in fact, have free will (Libet et al., 1983; Libet, 1999.) But missing from Libet et al.'s study, and from follow-ups, is discussion of what subjective experience of the task and of the moment of decision is actually like. We found that for all participants, experience of the task was markedly different from experience in their daily lives. Temporal consciousness was different as well. This raises concerns of ecological validity for the Libet experiment. We also found elements in experience anticipating the finger-movement decision before the actual reported decision. So there could be elements in our subjectivity leading to our decision-making that precede the neural firing of the readiness potential. This runs counter to the assumptions of Libet et al.'s study. If this is true, then the Libet experiment is no longer relevant to disproving free will.

This study here not only helps us better understand the Libet experiment and clarify discussions of free will—it also helps us better situate our method. It helps us 'triangulate' our introspective evidence with behavioral and physiological evidence (Jack and Roepstorff, 2002). We can compare our first-person data with third-person data on the time elapsed between the movement decision and the actual movement. And we're not directly using EEG here, but we can compare our study to previous ones using EEG. We can see what subjective experience corresponds to presumed neural activity that precedes 'free decisions.'

To use a term from Cronbach & Meehl, we can situate dDES in a "nomological net" (1955, p. 290)—the network of observables, including first-person and third-person ones that help build construct validity. Our specific combination of first- and third-person measures is an instance of 'neurophenomenology' as described by Francisco Varela in his 1996 paper. This domain designates the meeting of neuroscience and phenomenology. First-person reports and neurological data inform each other. Can they be directly linked? We may be able to point to a neural configuration and say that it corresponds to a specific mental state, but can we ever really say *why there is something that it is like* for this neural configuration. This question has become known as the "hard problem of consciousness"

(Chalmers, 1995, p. 201). Can we ever really know how subjective states arise from a physical basis? To Chalmers, there is an unbridgeable gap between these two domains. We can get close to the edges, but never fully cross this gulf. To Varella, first- and third-person measures inform each other through "mutual constraints" (1996, p. 344). Each measure challenges and refines the other. They are "partner in a dance" (Varela, 1999, p. 267). Dance partners never fuse bodies—and likewise we may never be able to fully answer the hard problem—but if all goes right, with feedback loops of movements triggering movements, they can feel as if they're moving as one. Our study, of course, doesn't deal directly with the hard problem. But it does contribute to the domain of neurophenomenology, building a body of knowledge on the relation between brain activity and subjectivity.

But all this theory aside, you may be asking: why bring in free will? What does it have to do with temporal consciousness? Our first answer is a practical if unexpected one. This experiment actually came before the development of dDES. We wanted to find a phenomenological method to look at experience during the Libet experiment. dDES arose from this. We needed a method that looked at experience over the full time-course of the neural activity preceding free decision. Standard DES was unsuitable for this since it might not reach back far enough in time. But we did like the iterative several-day training of DES that builds up the participant's skill in apprehending experience. We could've used micro-phenomenology but it doesn't involve this training. We therefore developed dDES, looking at two moments before a beep, with the intent that its scope extends far enough back in time to examine subjective experience corresponding to the neural readiness potential. So we wanted to see experience before the reported urge to move, but while brain zippy zaps were leading up to this urge.

This experiment is then an example of mutual constraints in action. Third-person data—the time course of the readiness potential—informed the temporal scope of our first-person measurement. Our enterprise is thus back-loaded phenomenology, to use a term inspired by Gallagher (2003). This means that we start with pre-existing third person results and clarify them with a first-person investigation. And this first-person data, in turn, informs how we interpret third-person data. What does the readiness potential correspond to in experience? Do the 'free decisions' in the Libet task relate to decision-making in everyday life? Does reported decision time in the Libet experiment really correspond to the earliest inklings of subjective decision-making?

So our development of dDES was a practical one. We needed a phenomenological method suited to the task at hand. But this raises a deeper question. Why does investigating free will lead to a method suited to investigate temporal consciousness? I don't think this is a coincidence. Investigating free will (or its lack) means investigating time. It means investigating how a decision leads to a certain outcome in the future. Or how an event (neural or psychological) in the past leads to a decision in the present. It's no coincidence

that setting out to look at 'free' will with a narrow temporal scope leads to the development of a method that looks at temporal experience with a narrow temporal scope.

And to better understand temporal consciousness, we need to understand agency. Do we experience agency? Even if we indeed don't have free will, does it still make sense to speak of the experience of agency? How does agency develop and change over time? We touched briefly on the subject of volition in the previous chapter but haven't dealt much with the question of agency. This chapter will correct that. Discussions of agency are crucial for phenomenological methods. Which introspective methods, then, give us the most insight into this question?

For instance, Horgan and Timmons (2011) believe that DES can't answer questions of agency. They write, "it may be that the DES method is too narrowly focused on the non-subtle and easily introspectible aspects of one's phenomenology at a very 'thin' time slice of one's ongoing experience to really reveal much about agentive phenomenology" (p. 198). So DES looks at too thin a time slice. Is this true? We'll look at past DES findings and see if they can tell us anything about agency. And we'll look at dDES findings as well. It is, after all, a thicker time slice. Thick enough to tell us about agency? We'll see that even with phenomenological data, questions about agency or active/passive distinctions in experience are complex. But they certainly can't be addressed without discussion of consciousness and time. Time, consciousness, and will (free or not) are wrapped up together.[38]

Background

Although in this thesis we sometimes refer to 'the Libet experiment' as shorthand for experiments investigating the readiness potential, these have prior roots. Kornhuber and Deecke (1965) found a build-up of electrical activity in the brain before freely performed limb movements. This became known as the 'readiness potential.' So participants had neural activity before they moved their limbs.

Libet et al. (1983) added a clock to the experiment. It rotated with a 2.56-second revolution. This simple addition was an important one. Participants noted when they first had the intention to move their finger. They observed the position of the clock when they first had this urge. The specially designed clock made it easy to locate this moment of the urge with precision.

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[38] I could say that 'free' will is the herbs in our consciousness time omelet, but you're probably sick of my food metaphors by now.

Fig. 41. Libet clock
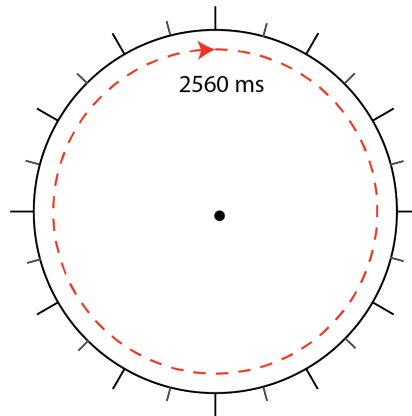
Participants were supposed to let the urge to move their finger appear at any time without preplanning. The researchers called this time of the urge 'W-time.' Remember this expression—we'll refer back to W-time. They found neural activity on average about 350 ms before W-time. So there is activity in our brain before we even have the urge to move. Compare this to Kornhuber and Deecke's experiment, which found neural activity *before movements*. Libet et al. found neural activity *before the urge to move*.

Fig. 42. Readiness potential
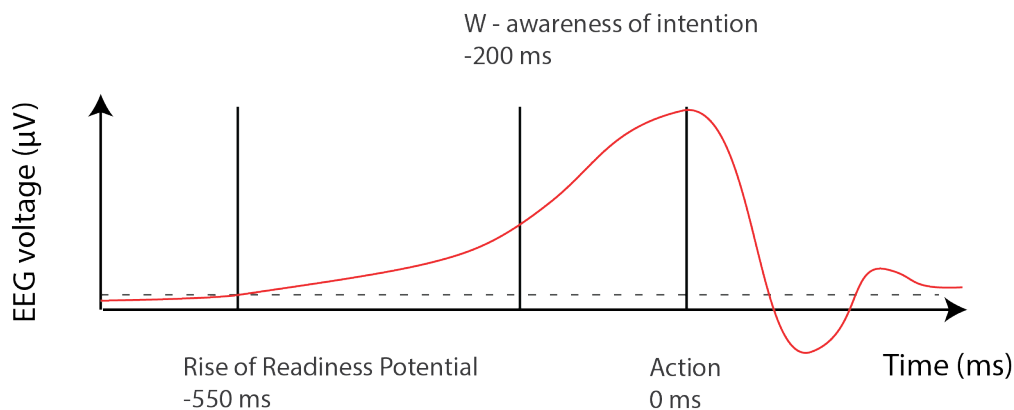
Could this mean that there is activity in our brain preceding any of our choices and decisions? Could this mean that everything we do is simply determined by the mechanistic firing of our neurons; that we don't have any free will?

Libet et al.'s results have been replicated (Dominik et al., 2018). Some have argued that experiments like the Libet experiment end free will as we know it (Wegner, 2002). Libet and colleagues did in fact argue that our decisions first emerge unconsciously. However, they maintained the possibility of vetoing a decision, in what could be called 'free won't' (Libet et al., 1983; Libet, 1999). From a philosophical perspective, does the Libet experiment, in fact, disprove free will?

From a compatibilist view, no. Even if we live in a fully deterministic universe, we still could have free will. By some interpretations, free will lies in another explanatory level, of individual subjectivity. So even if our neurons fire in a certain way, determining our every action, we can still retain free will.

However, from a so-called libertarian perspective, free will is not compatible with determinism (Kane, 2002). For libertarians, the Libet experiment really may spell the death of free will. If neural activity does precede our urge to move a finger, then that movement is determined. If neural activity precedes all of our urges and decisions, then they are determined. But even from a libertarian perspective, there exist criticisms of the Libet experiment.

One is critique is of ecological validity—that the urge to press the button in the task in no way relates to free decisions in real life (Brass, Furstenberg, and Mele, 2019). Indeed, we'll see that experience during the task is quite different from experience in everyday life. But different enough to invalidate the implications of the Libet experiment? We'll return to this question.

Another critique is that the decision to press the button may actually come before the reported urge. Studies have shown that by randomly probing participants, W-time can move earlier from the onset of movement (Matsuhashi & Hallett, 2008; Parés-Pujolràs et al., 2019). Parés-Pujolràs et al. write, "Our results seem consistent with a control process that is accompanied by conscious experience. At the same time, they seem to provide evidence against the view that conscious control of voluntary action is illusory, or mere post-hoc confabulation." (p. 8) So by this view, we do have conscious control over our actions. With our study, we'll also see instances where conscious experience relating to decision-making precedes W-time and the readiness potential. Are these findings enough to bolster this critique?

A third critique is that the process of observing the conscious intention to move alters experience in a substantial way (Lau et al., 2004). So by reporting on 'the urge' to move you're altering your experience of this urge. Findings of the Libet experiment could then be distorted by the introspective process.

All of these criticisms are ones we can investigate.[39] How does a participant's experience during the task relate to their experience in daily life? Is it substantially different? Enough to uphold criticisms of the Libet experiment for lacking ecological validity? And also does the decision to move one's finger really come at W-time? The Libet experiment makes phenomenological assumptions that there is nothing in experience before W-time

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[39] Although other criticisms exist that are beyond the scope of our investigation—for example, that the readiness potential is a product of ongoing spontaneous neural fluctuations that must cross a certain threshold in order to initiate action, and that this threshold corresponds to W-time. This places the role of the readiness potential not as an unconscious decisional process, but more like neural noise (Schurger et al., 2012).

constituting or leading up to a decision to move. Finally, does the process of observing the urge at W-time substantially alter experience? Studying inner experience during the Libet task should answer these questions.

Methods

For greater detail on the experimental design, see Appendix IIB. Hopefully, the following description suffices as a cursory illustration. Our study involved three participants. We preferred a smaller number of participants trained in apprehending inner experience, as opposed to a larger number of untrained participants. This bears resemblance to a Libet task study by Jo and colleagues that relied on one expert meditator (2014).

We first trained participants with standard DES—6 beeps a day, jotting down their experience of the moment before the beep, and 1-hour interviews about the beeps within 24 hours. Once participants were able to carefully apprehend the moment of the beep, we switched from DES to dDES. So we switched from reporting one moment before the beep, to reporting two moments, as well as the temporal dynamics of these moments. For Adrien and Ali, this switch was after the third day of DES sampling. For Matej, this was after the second day. We ended up with five total days of training for each participant.

After training, participants then engaged in the Libet task. They sat facing a rotating clock on a computer (adapted from Vinding et al. 2013). They were instructed to press a button when they felt an urge to press. They noted the position of the clock when they had this urge. So *not* the clock position when the pressed the button, but when they *first had the urge* to press the button.

Participants heard beeps throughout this task. Some were triggered by participants pressing the button. Let's call these 'on-button' moments. Some were at random times. Let's call these 'off-button moments.'

There were two sessions of this task on two different days, although for Ali there was one session. So the total number of collected samples varied for each participant—5 for Ali, 8 for Adrien, 9 for Matej.

After each beep, participants jotted down what was in their experience for the two moments before this beep. After all beeps for the day were collected, participants were given expositional interviews, following standard dDES procedure (as seen in Chapters 3 and 7).

Fig. 43. Experimental design
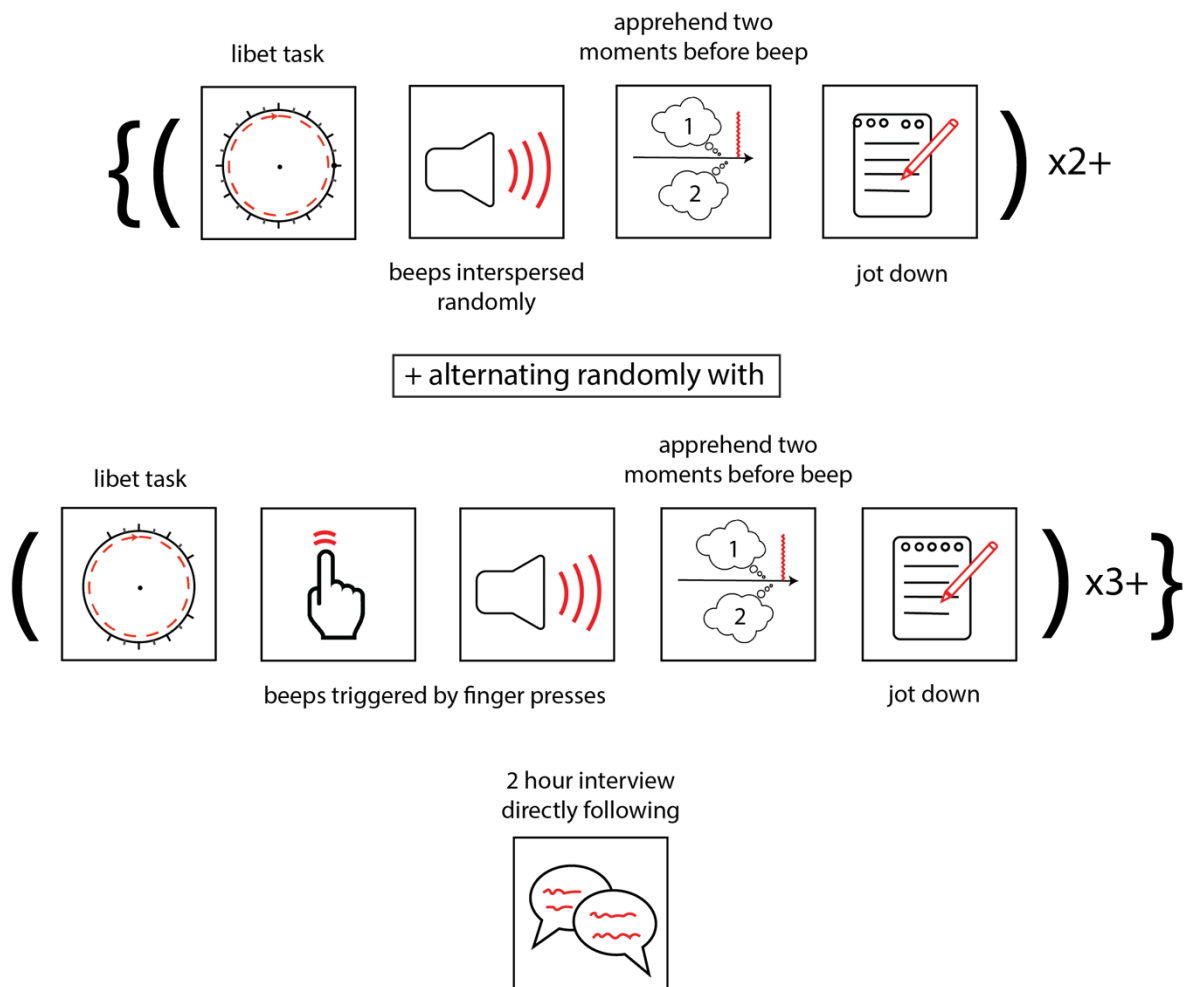
Findings

<u>Ali</u>

We'll first look at experience of the task for individual participants before we turn to any generalizations. Interestingly enough, the most salient aspect of Ali's task experience is not his experience of button presses, but his experience during the randomized beeps. So what's most pertinent is his experience of 'off-button' moments, not 'on-button' ones. During both (100%) of these off-button moments, Ali's experience was of saying to himself that he was going to press the button. This was far before W-time—far before his reported 'urge' to press. Let's look at part of one of these samples.

> **Sample T1.2 M2**
> Ali is innerly speaking "I want to press, I want to press." But wanting to press is not part of his experience at the moment. The speech is in his own voice. The vocal qualities are playful and rhythmically stressed.
> Ali is also shaking his head. This is in the same rhythm as the inner speaking. The movement is more passive, but he's still aware of it. <u>Coding</u>: Inner speaking, doing

Again, this was at a random point in the task and not directly before Ali was pressing the button. Still, "I want to press" was part of his experience. For the other moment, Ali was singing to himself "let's do it, shall we do it?" with the "it" referring to pressing the button. Both of these moments were far before W-time.

Ali stressed that at both of these moments there was no intention to press the button. Still, these results complicate the Libet study and contribute to the critique that the moment of free decision may come before W-time. Libet et al. (1983) assume that before W-time, there is nothing in experience constituting or leading up to a free decision. In their task, Libet et al. specifically ask participants for spontaneous movements. The instructions are "to let the urge to act appear on its own at any time without any preplanning or concentration on when to act" (Libet et al., 1983, p. 625). They write, "all of the self-initiated acts were described as 'spontaneous'; the subjects reported that each urge or wish to act appeared suddenly 'out of nowhere', with no specific preplanning or preawareness that it was about to happen" (p. 638).[40]

A thought like 'I want to press' complicates presumptions of the Libet experiment. We can't be sure what it means, but there are two possibilities. A) That this though contributed in some way to a later urge to act. B) That this thought in no way contributed to a later urge. In the case of possibility B, then assumptions of the Libet task would still hold—that there is no conscious intention to press before W-time. But in the case of possibility A, the assumptions of the Libet study would no longer hold. Just the existence of possibility A puts the premise of the Libet study on the line.

Turning to Ali's samples in general, we see one overwhelming commonality. All samples involve some aspect of coping with boredom. They involve either a direct feeling of boredom or an action that Ali describes as a reaction against boredom. In Sample 1, Ali is saying, "I…I…I," rhythmically playing with the vocal qualities. In Sample 2, Ali is shaking his head and engaging in rhythmic inner speech. In Sample 3, Ali is singing, "let's do it, shall we do it?" In Sample 4, Ali is innerly speaking, "I am bored." In Sample 5, Ali is innerly speaking, "this is a boring task." All samples involve either a feeling of boredom (without bodily location), or at least reaction to boredom.[41]

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[40] They also write that "the subjects confirmed that for W reports they concentrated on noting their *earliest* awareness of any urge/intention to move" (p. 639, emphasis in original). This applies to type II readiness potentials. Libet et al. categorize various kinds of readiness potentials, some occurring earlier than others. It's possible that none of Ali's samples are of type II readiness potentials. This raises the need for experimental confirmation of our pilot study with EEG.

They also specifically exclude acts where participants report preplanning. But here Ali specified that his experience wasn't of pre-planning. Still, it seems like some proto-intention may be involved. This raises the possibility that even if you ask participants to exclude preplanning, there still may be certain subjective mental processes leading up to 'the urge to act.' Participants may not be retrospectively aware of these processes.

[41] Where is W-time in Ali's samples? It may fall on Moment 2, although it's hard to line up the first- and third-person methods in our study. In one button press sample (T1.4), there's nothing in experience that

Something else to notice is how different Ali's Libet task experiences are compared to his hypomanic training day experiences. Inner images are no longer present. Experience is less multiple. There's no presence of Rapid fluctuating awareness. The task significantly altered experience.[42]

Matej

We saw that in Matej's everyday life, he had frequent highly localized inner speaking and hearing, and occasional highly localized feelings. For the Libet task, Matej also had ubiquitous highly localized aspects. They were present in 100% of his on-button press samples, and in all but one of his total samples. Here, instead of the localized aspects being mostly verbal, they were characterized as highly localized urges. Some, Matej called 'urges.' Others he called 'tension.' Many samples blur boundaries between what tradition-ally gets coded either as feeling or sensory awareness. The localization could shift and transform. Here's one example:

Sample T2.1

Moment 1: Matej feels steady and quickly growing tension. It comes from his right temple (a 3-dimensional complex shape, about 4 cm in diameter) and expands to other parts of the body, mainly the head and the arm, but not lower. He describes it as light emanating from this region. This is between metaphorical and literal. It feels cold, and this is also between meta-phorical and literal.

He's also seeing the clock, watching the dot move fast. Coding: Highly localized feeling, perceptual awareness

Moment 2: Matej feels pressure on his finger from where it's touching the key. Coding: Sensory awareness

Temporal: The growing tension turned to the pressure. The two experiential aspects were linked, not just two separate aspects one after the other. Coding: Transformation

highly localized feeing to sensory awareness
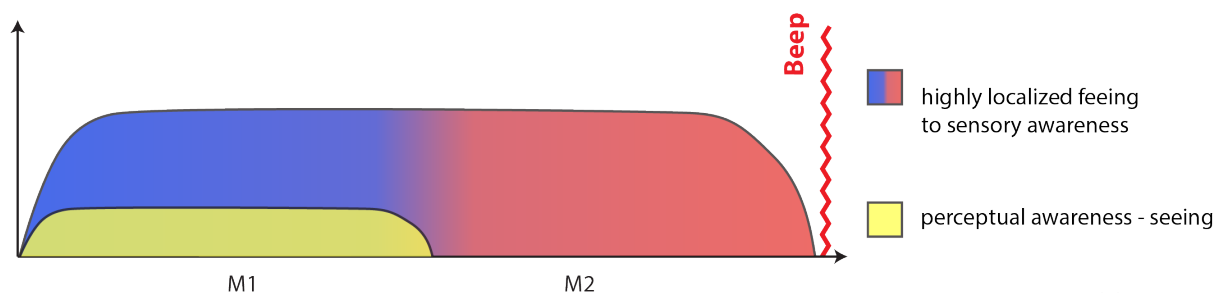
perceptual awareness - seeing

Fig. 44

looks like a 'decision to press.' Ali just has the thought/feeling: I am bored. This shows that the button press didn't even always enter conscious experience. In fact, for Ali, only 1 out of 3 button press moments could vernacularly be said to involve a 'decision'.

[42] It's also possible that Ali was coming out of a hypomanic phase on the day of the Libet task. However, Ali's Libet task experience is still different from his daily life experience before his hypomanic period, for in-stance regarding mental images.

We have a highly localized urge or tension. It shifts position, starting in a complex shape in his right temple, and then emanating out like cold light. It turns into pressure in Matej's finger in Moment 2. Matej's localized urges had different shapes and characteristics—for example, pressure around the temporal lobes, a golf ball sized region spreading out, a flat disk, a small spot opening up, a bulb 'being born,' a thin strip above the right eye, and a growing ball next to the right eye. The Libet experiment purports to investigate a free decision. But what does this mean in terms of experience? Most people, when asked what a decision is, would not think to say, 'a thin strip of tension above the right eye.' This shows why phenomenological investigation is necessary. We cannot assume to know what is going through people's heads during a task. As we've seen repeatedly, experience is unique for each individual. This is why ideographic methods are important for investigating task experience—for this task, as well as for any other psychological task, especially canonical ones.

Here the expanding tension turns into pressure in Matej's finger. This brings us to another salient feature of Matej's temporal experience during the Libet task—the temporal relation of the two moments was predominantly a Transformation. This was the case for 4 of the 6 button press samples. In contrast, in Matej's daily life, Transformations were only present for 2 of 9 of his samples. So this task changed Matej's experience substantially, even changing his temporal experience—the way moments relate. Let's look at another sample.

> **Sample T2.4**
> Moment 1: Matej experiences the feeling of a slightly growing ball in his temple, next to his right eye. It grows from about the size of a chickpea and doesn't get much bigger.
> It corresponds to a visual experience, or rather the feeling of an image. This image is outside his field of view. It's of a black ball enclosed in a circular space. This space is darker towards the borders and lighter as it goes towards the ball. The ball grows within this space, although doesn't fill it up.
> Matej calls these aspects "initiation." Coding: Highly localized sensory awareness, imageless seeing
>
> Moment 2: Matej feels a growing tension in his right arm. The region is approximately from his mid forearm to above his elbow. These top and bottom borders aren't so defined, although the side borders are more defined—a strip up his arm. Coding: Highly localized sensory awareness
>
> Temporal: When the ball grew to a certain size, the tension in the right arm started. The two aspects were connected, as in part of the same process. Spatial connection is uncertain—although at one point Matej described the experience as the ball falling down into the feeling in the forearm. This is uncertain. In any case, it was more of a connection of attention rather than a purely spatial connection. There was no overlap where both the forearm sensation and the ball were present.

Fig. 45
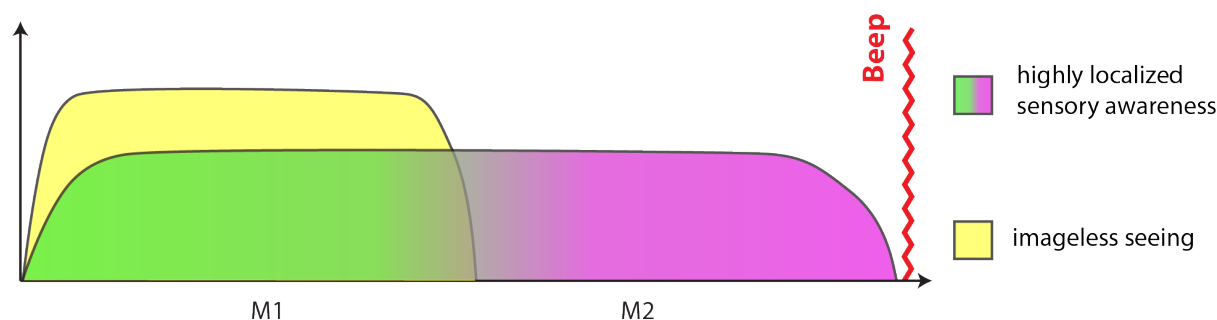
Again, we have a highly localized aspect. We could call it an urge, although here Matej calls it "initiation." There's also an element of imageless seeing. Matej has something resembling an image, but closer to the feeling of an image. There are visual attributes, but nothing is explicitly visual. And again, we have a transformation. The growing ball in the temple is connected to the tension in the arm. These aren't completely separate aspects. M1 "initiation" turns into M2 tension.

Again, this experience is quite different from his daily life experience. In daily life, Matej had frequent highly localized elements, but they were most often of inner speaking or hearing. In the task, highly localized elements were 'urges' or tension. Temporal dynamics were also different. In the task, Transformations tripled in proportion to his experience. So we've seen that the task altered Matej's experience and altered his temporal consciousness.[43]

Another aspect to note is that Matej's language was often quite passive. For one sample, he described the urge to press as a bulb which "was born." This moment was notably passive for Matej. Matej used other passive formulations, although at other times, active/passive distinctions weren't so clear for him.

Matej's experience during the task is quite different from his experience in daily life, including regarding his temporal experience. Task experience also sometimes involved an emotional component—feelings of negative valence e.g. nervousness. Matej reported the task as challenging and nerve-racking. This has some bearing for the ecological validity critique of the Libet experiment. Nervousness was more predominant for Matej's Libet task experience than for his daily life.

<u>Adrien</u>

The task altered Adrien's temporal dynamics as well. In his everyday life, the code Interruption took up 9% of his transitions. For the task, 83% of his button press experiences involved transitions coded as Interruption (5/6 button presses). The task indeed seems to have changed his temporal consciousness. Recall that in an Interruption, M2 experience

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[43] Another question: what does W-time correspond to? We can't directly link the phenomenological data to third-person measurements. W-time may come at the start of the highly localized urges. Or these may very well correspond to the readiness potential before W-time. It's hard to say for certain.

brusquely cuts off M1 experience. There is no gradual fading between experience. Here's an example from the task:

Sample T1.3

Moment 1: Adrien is a bit unsure of this moment. But he describes it as "empty expectation." He's "waiting." There's no bodily location. Adrien describes it with the term "tensed." Coding: Expectation(?)

Moment 2: Adrien has the experience of knowing he's pressing the button. Part of this knowing is seeing the dot on the screen pressing on the clock. So it's not experienced as his fingers pressing the keyboard but as the dot pressing. It still feels like it's him doing the pressing.
Adrien says the distinction between active and passive isn't really part of his experience. But he describes Moment 2 as feeling more active and the transition as feeling more passive. Coding: Sensory thought

Temporal: The knowing-he-was-pressing interrupted the farthest moment. It was very abrupt with nothing gradual about it. Coding: Interruption

Fig. 46
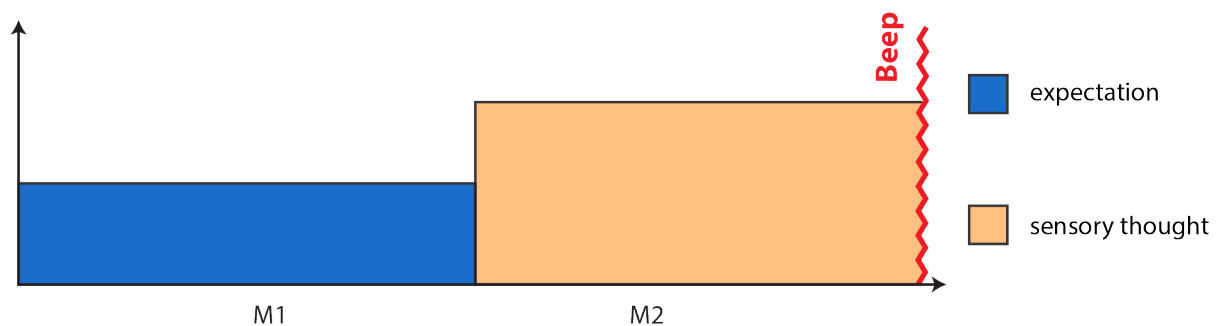
We see an Interruption. Moment 2 interrupts Moment 1. It's sudden, and not at all gradual. So the task changed Adrien's temporal experience. He had a kind of temporal transition that he rarely had in his everyday life.

Another interesting aspect is that Moment 2 is most often "knowing" he's pressing the button. This was the case for 4/6 button press samples. The knowing often comes with a sensory aspect, of the dot pressing on the line. We see in the sample above that it's like the dot is doing the pressing.

Note that, like with Matej, the language is passive—of "knowing" he is pressing. When asked if these moments were active and passive, Adrien said that the transition between

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Moment 1 and Moment 2 felt passive. Moment 2, however, felt active. This is interesting—even with passive language, the moment felt active, indicating that we can't go off language use alone when judging active/passive distinction.[44]

Discussion

<u>Decisional processes before W-time</u>

For the Libet task findings to dismantle (libertarian) free will, one needs to assume that there is nothing in subjectivity that leads up to or causes the 'urge' to move one's finger. This is indeed an assumption that Libet and colleagues make. They write, "each urge or wish to act appeared suddenly out of nowhere, with no specific pre-planning or pre-awareness that it was about to happen" (Libet et al., 1983, p. 638). But we've seen throughout this thesis that people don't always have access to their subjectivity. Could there have been pre-planning that they weren't retrospectively aware of? It's possible.

We saw that Ali had thoughts like "I want to press" and "let's do it, shall we do it" long before the actual button press and long before W-time. It makes sense to call these aspects of pre-planning or pre-awareness. Ali clarified that these thoughts didn't mean that he actually wanted to press the button. Still, it's quite possible that they in some way contributed to the later button press.[45]

If this is the case, then Libet and colleagues' conclusions are on the line. There could be aspects in subjectivity leading up to the urge to press that far precede the readiness potential. Our decisions don't necessarily first arise unconsciously. Is this experiment enough to falsify the Libet study? Not definitively yet. This could be considered an elaborate pilot study. A follow-up would need to involve EEG, to make sure that we find the readiness potential (and would need to make other technical distinctions that Libet et al. make, such as identifying different kinds of readiness potentials).[46]

But findings so far are certainly a wrench in the gears of interpretations that the Libet study dismantles free will. We can say that at least some participants have something in experience leading up to a free decision before W-time. So, for at least some participants, assumptions of the Libet experiment don't hold.

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[44] The fact that the transition from Moment 1 to Moment 2 felt passive hints that this time may correspond to the readiness potential in neural activity. Whereas Moment 2 corresponds to W-time. However, this is just a hypothesis.

[45] The fact that Ali denied they meant he wanted to press the button shows that he may not have reported them as instances of preplanning (in line with Libet et al.'s participants), but that they did indeed contribute *in some way* to the later button press.

[46] We should also note that Lakatos (1970) points out that it's a myth that science rests on falsifiability, as Karl Popper claimed (1935/2005). There is no fact pure and simple that could do the job of falsifying a theory. Every fact relies on a network of surrounding theories to establish its validity. Every DES sample we present requires that you trust the system of beliefs in which it's embedded. Those who wish to uphold the Libet study will undoubtedly find something in DES to criticize.

For all participants, temporal consciousness during the task was quite different from in everyday life. For the task, Matej had Transformations in 67% of button-press samples. In everyday life, he had this transition in 22% of samples. Adrien had Interruptions in 83% of button press samples. In everyday life, he had this transition in 9% of his samples. Ali, had Rapid fluctuating awareness in 0% of his task samples but 43% of his daily life samples. Note that this discrepancy may have been due to him coming out of a hypomanic phase. Still, the task did alter the content of his experience. Every sample involved some aspect of boredom or coping with boredom.

It's quite apparent that experience during the Libet task is different from experience during everyday life. But this is true of any task. As Hurlburt has shown in his collaboration with neuroscientists, task experience can be quite different from similar categories of experience off-task (Hurlburt et al. 2016). For example, task elicited inner speaking activates different brain regions than spontaneous inner speaking.

But the fact that task experience can be different from everyday life experience doesn't necessarily disqualify the Libet task. The point of a task is to target specific phenomena that are comparable to those in daily life—in this case, the phenomenon of making a free decision. If decisions in the Libet task are similar to (at least some relevant) decisions in daily life, we can still call the task ecologically valid. If we have brain activity before our decisional urges during a task, we have the same brain activity in our daily life. At least this is the assumption (Libet et al., 1983; Libet, 1999). But are our decisions during the Libet task really comparable to our decisions in everyday life? Let's investigate.

Agency

Jo et al. (2014) looked at one expert meditator's experience of the Libet task. Supposedly this meditator was more skilled at introspection than untrained participants. The meditator experienced the Libet task as quite passive, with some decisions feeling more passive than others. This could be used for a critique of ecological validity. If Libet decisions are passive but decisions in everyday life are active, perhaps our everyday decisions could involve free will.

The distinction between active and passive isn't one that DES usually makes. Interviewers don't typically ask participants if their experience was active or passive. Horgan and Timmons (2011) criticize DES saying that it can't get at questions of agency. They write, "it may be that the DES method is too narrowly focused on the non-subtle and easily introspectible aspects of one's phenomenology at a very 'thin' time slice of one's ongoing experience to really reveal much about agentive phenomenology" (p. 198). Their criteria for free will are that A) actions are as if emanating from oneself as a source, and B) actions are such that one could have acted otherwise. They don't think introspective methods can

access these aspects.[47] Horgan and Timmons write, "We ourselves are fairly pessimistic about the power of any known method of introspection (or combined introspectionist methods) to reliably deliver answers to questions about the phenomenology of agency that would either favour or disfavour (even for a restricted range of types of agentive experience) the hypothesis that such experiences possess libertarian satisfaction conditions" (p. 203).

So they're pessimistic about introspective methods answering questions of agency. But they write concerning their own armchair introspection, "We ourselves think, however, that it is introspectively *just obvious* that actions are normally experienced as emanating from oneself as source, and also are normally experienced as being such that one could have done otherwise in the actual circumstances" (p. 188). DES doesn't trust the "just obvious." This is often where our most tenacious presuppositions lie. It's a strange dual position on the part of the authors that they think questions of agency are *too subtle* for methods like DES to get at, but also *so obvious* that their own armchair introspection is capable of clarifying them. As we've seen, armchair introspection often misrepresents experience. Let's look at what we found with DES and dDES.

We never specifically used Horgan and Timmon's criteria and terminology in our study. We started with Jo et al's (2014) framework of active vs passive. From the reports, it seems like criterion A—actions emanating from oneself as a source—was the case. Criterion B—actions being such that one could have done otherwise—is trickier. But our active vs. passive distinction could serve as a stand-in. Presumably for an action to have been otherwise, it must at least be active (although this equivalence is debatable).

Decisions during the Libet task were overall quite passive. Adrien described M2 as active, but the transition between M1 and M2 as passive. However, his language was passive regarding both moments, showing that one can't infer from language alone. Ali's descriptions of the urge were passive. In one sample, experience of the button press was missing entirely. Matej's language was passive, but distinctions between active and passive weren't so clear to him. So experience of the Libet task was often passive. But this distinction was complicated.

Are decisions in everyday life active or passive? We do have some samples involving decisions. For example, in Ali's Sample 4.3 he made a decision not to reply to a text. In Sample 4.2 Ali was conflicted about whether or not to smoke out of the window and in M2

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[47] We should note that there are other theoretical frames for viewing agency. Gallagher (2003) distinguishes between sense of agency (sometimes called 'authorship') and sense of ownership. Sense of ownership corresponds to actions emanating from oneself as a source. Sense of authorship is comparable, if somewhat different, from actions being such that one could have done otherwise. See Hurlburt and Stuart (2014) for a discussion of these distinctions in DES.

made the decision to smoke. This was experienced as a resolution of tension. These samples were more active than his Libet button press urges, which in one instance was not experienced at all.[48]

But while some decisions in daily life appear somewhat active, others are more passive. For example, in Sample 4.1 in M1 Clara was looking for the second sock in a pair. In M2, she was no longer looking. Between these moments, she decided to stop looking for the second sock, but this decision was not experienced. In Ali's Sample 1.2, he was tapping his foot in time to raindrops. At this moment, he started realizing he was doing this. He later described, "I felt I was not doing it with free will." Both of these decisions/actions are notably passive.

Other passive examples exist in DES literature. For example, in one sample Belinda was innerly speaking "Let's go to Burger King" but then said out loud "Let's go to KFC." She had no impression of changing her mind. And she had no shock of the discrepancy (Hurlburt et al., 2013, p. 1484). Her 'decision' was not a conscious one. For another example of passive action, take Cobo, the virtuoso guitarist. Cobo understands himself more as the observer and receiver of his thought process than as the driver. For example, in one sample he's in the middle of a thought about what to enter into MySpace. He's "letting the thought flow, not trying to shape it, just understanding what he's doing." (Hurlburt, 2011, p. 263) At this moment, several other things are in Cobo's awareness, including possibly talking to his wife, telling her what he's thinking about the site. The conversation is just happening and he's not paying much attention to it. With both of these elements—the MySpace thought and the conversation with his wife—Cobo is more the passive receiver of experience than the active driver. Does this have implications for authorship or for criteria B—actions being such that one could have done otherwise? We mentioned that it's not a neat mapping from the active/passive distinction to Horgan and Timmon's criteria. But we could infer that for Cobo, for some samples, criteria B does not hold. Even if this is too far a stretch, the *least* we can say is that it is not "*just obvious*" that actions are such that one could have done otherwise (p. 188).

Cobo also had multiple simultaneous asynchronous streams of experience. These would grow and fade, independently from each other. Hurlburt writes that no one of these streams, "nor the aggregate seemed to have an ascendant claim on being or reflecting a self." (Hurlburt & Stuart, 2014, p. 259) For Cobo, there may not be one self, but a variety of simultaneous independent streams of experience. Hurlburt uses this to show that questions of authorship and agency are not as clear-cut as the theoretical work presumes. Let's return to criteria A—actions emanating from oneself as the source. For Cobo there is no

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[48] Sripada argues that we make decisions frequently in our spontaneous streams of thought. Each time we mentally switch from one topic to another, this is a minimal decision involving some sense of agency. This switch is in a grey area between active and passive (publication forthcoming although available at Sripada, 2020).

one stream that could be said to represent the self. Each of his waxing and waning strands of thought are independent. The problem with criteria A may be its very premise—that there is an entity that can be reliably called 'the self.' So the *least* we can say is that criteria A is far from "*just obvious*".

Returning to Horgan and Timmon's (2011) critique of introspective methods, DES can ask if experience was active or passive. It can ask about authorship and ownership. It can even ask if an action felt like it could have been otherwise. But such questions are not typical. They may require subjects to *interpret* their direct experience rather than *report it*. However, the distinction between interpreting and reporting isn't so clear-cut. For example, when a participant reports on whether or not their mental image has borders, this is also in a sense *interpreting*. They have to analyze their image based on knowledge pertaining to visualization—e.g. what borders are, what they would look like surrounding an image. This kind of *interpretation* we might call *reporting* since it seems more obvious.

So the distinction between interpreting and reporting is one of degrees rather than clear separation. With the case of distinguishing active vs passive, this is sometimes easy to do but not always. DES tries to avoid the excessively faint and hard to detect since these aspects lie within its margin of error. It's possible with DES and dDES to delve into questions of agency, but we must acknowledge the increased chance of errors, and the fact that different participants may mean different things by 'active' or 'passive.' I would not follow suit with Horgan and Timmons' pessimism about agency as a fruitful domain for introspective methods. Just that we must be careful.

Conclusion

So the Libet task may be more passive than certain decisions in everyday life. But not all. In fact, of all libertarian critiques of the Libet experiment, the topic of active vs. passive decisions is the knottiest.

What is clear is that the Libet task altered temporal consciousness. Matej had an increase of Transformations. Adrien had an increase of Interruptions. Ali had a decrease of Rapid fluctuating awareness, and an increase of boredom.

Perhaps the most salient finding regards proto-intention before the button press and the urge to press (W-time). Ali had the thoughts "I want to press" and "let's do it, shall we do it?" far before W-time. These samples go against assumptions of the Libet task that before W-time, nothing in experience leads up to the urge to move.

These findings complicate the Libet experiment. It's not quite the nail in the coffin of free will that some say. Questions remain regarding the experiment's ecological validity. Questions remain regarding core assumptions—that nothing in experience leads up to the urge at W-time.

But dDES and DES results can't exactly be used to uphold free will either. Often regular DES samples appear quite passive. In other cases, the active vs. passive distinction is quite hard to make. And perhaps it can't always be made. Asking participants to use these categories may impose external theory on their experience.

In the end, our understandings of dDES and the Libet study mutually strengthen each other. We understand that experience of the Libet task is heterogenous—it can involve shifting localizations, or knowing one is pressing the button, or reactions to boredom. Aspects of proto-intention may come far before the urge to press. And regarding dDES, we understand that agentive phenomenology is an important aspect of inner experience that can't be ignored. Some decisions are notably more active or passive than others. Sometimes experience can seem active even though the language we use to describe it is passive. Sometimes volitional aspects can go 'underground' as part of other elements. Regarding questions of ownership, sometimes there is no one ascendant locus of the self. So discussions of A) actions emanating from oneself and B) actions being such that one could have acted otherwise, are still murky. dDES can uncover some subtleties of experience, but some may lie beyond its grasp, or beyond the grasp of any introspective method for that matter.

This study has limitations. It involves a small sample size and a novel method (more limitations are discussed in Appendix IIB). But we've seen that first- and third- person measures can inform each other. It was because of this Libet experiment that we came up with the dDES technique. And the technique involves sampling in everyday life, which can in turn inform the third-person measures. We were able to look at active vs passive decisions in everyday life and use this to discuss the ecological validity of the task, and whether the readiness potential might still be present before our decisions in daily life. Here the two fields of neuroscience and phenomenology co-constitute each other. Third- and first-person methods are partners in a dance, circling each other.

We've seen that free will cannot be studied in a proverbial vacuum. The Libet experiment and its offshoots are important. But they must be tied to experience in our daily lives if they are to say anything beyond people pinpointing the location of a clock hand. The ultimate question is: does the Libet experiment disprove free will? At least according to a libertarian framework, whereby free will is incompatible with a fully determined universe?

We haven't answered this question but we have investigated methods that could be used for this means. In doing so we have come across another cluster of intermixed phenomena—that of free will, experience, and time. Thinkers like Bergson have argued that these components are inseparable (1889/2001). Repeatedly we saw that investigating one component entailed investigating the others:

—Investigating 'free' will means investigating time, since 'free' will is defined by how past influences present or how present influences future, in terms of action and consequence, decision and result.

—Investigating 'free' will means investigating experience, since it means asking what exactly occurs in experience before a conscious decision, and before the neurological markers of that decision.

—Investigating experience means investigating 'free' will, since agency, decision processes, and volition are crucial aspects of experience.

—As we've seen throughout this thesis, investigating experience means investigating time, since only by understanding temporal dynamics can we understand what experience actually is.

—And finally, investigating time means investigating experience and 'free' will, since time may not be a fundamental fixed physical property of the universe, only relative, based for instance on the speed of observer, or how mass warps space-time at the point of observation. And perhaps the laws of the universe can be written entirely without an appeal to time, but based solely on how entities change and relate to each other (DeWitt, 1967). So our perception of time, as skewed as it is, is dependent on how our experience makes sense of this property, and how our history of action, based on will—free or not—leads us to make sense of this property, or even create it entirely.

16. Temporal consciousness

Back in the introduction, we introduced three perspectives on temporal consciousness—cinematic, retentionalist, and extensionalist. These perspectives all try to answer the question of how we perceive change, succession, and persistence at all. We're only directly aware of the present, but the present is momentary. So how do we apprehend phenomena that have temporal extension? For example, when we hear a melody ABCD, how come at the end we don't just hear D but also have a sense of the ABC part?

An excellent overview can be found in Dainton's Stanford Encyclopedia article on temporal consciousness (2018). Dainton groups perspectives into the three categories mentioned—cinematic, where consciousness is atomistic, akin to still frames of a movie; retentionalist, where conscious episodes don't have temporal extension but include 'primal' memories to other episodes; and extensionalist, where episodes of consciousness extend over time. In Dainton's other work he uses different categories, and his books *Time and Space* (2010) and *Stream of Consciousness* (2000) are illuminating as well. But this three-pronged grouping is a parsimonious one and serves as a clear overview. Authors presented here don't always use this same categorization. And some have changed their positions throughout their careers, so we should keep in mind that these groupings are schematic approximations. But let's delve into these three perspectives. We'll then turn to the question of what dDES findings tell us about these groupings. We'll see that our findings don't fit neatly into any of these perspectives. These models can be adapted to fit dDES data. Or our data can be used to create entirely new models.

The cinematic view

According to this view, our consciousness lacks any temporal extension. It's built from a continuous stream of momentary states. You could compare it to a movie. When you watch a movie, you see motion. But movies are made up of individual still images, played fast. The same goes for our consciousness. The momentary states of our consciousness give the illusion of change, succession, and persistence. So when you hear the melody ABCD, you're not conscious of this whole melody as such. Your conscious moments are more something like: A A A A B B B B C C C C D D D D.
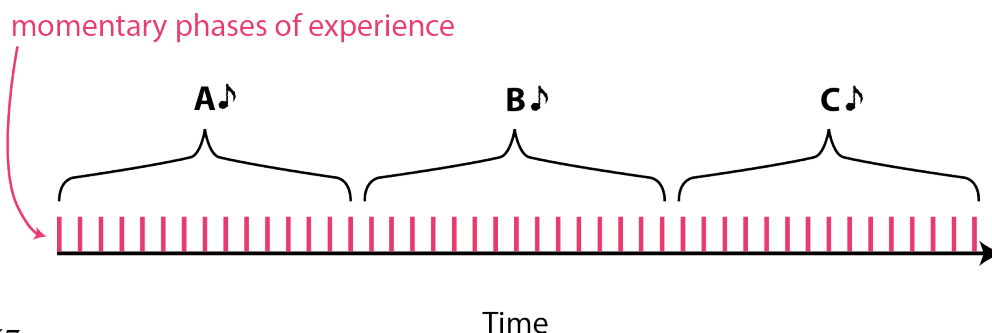
Fig. *47*

There's some some psychophysical and neuroscientific backing to this view. Our perception is not infinitely fine-grained. When stimuli are presented close together, they're perceived simultaneously (Efron, 1970). Pockett (2003) found that stimuli of around 1 msec need to be separated from one another by an interval of around 45-50 msec to be perceived as a succession. Could it be that at close intervals we see how our consciousness is broken into atomistic moments?

Or take the wagon wheel illusion. A spinning wheel can sometimes appear to be rotating slower or even in reverse. This is probably due to discrete sampling (Purves et al., 1996). Since you're sampling the wheel only at certain times, these samples could coalesce in a pattern where it appears the wheel's rotating backward.

Or take the color phi phenomenon. Two colored disks are presented in rapid succession in different positions. But you don't just see the two disks in these two positions. It appears as if one disk moves between the two positions and changes color in the middle of its trajectory. You see the disk in an area where it was never actually presented, in a color it was never presented in. Since this is impossible, it's argued that the conscious percept must have been formed retrospectively (Herzog et al., 2016).

Herzog and colleagues propose a model where information is unconsciously processed with relatively high resolution. Conscious percepts occur at a much slower rate, at discrete moments, 'representing' the output of unconscious processing (2016). So you unconsciously take in information—a a a a a—and at a much slower rate form conscious percepts representing the output of this processing—A. These conscious percepts come at discrete moments.[49]

We can also see examples of this cinematic view in Eastern philosophy. In the third century B.C., the Abhidharma Buddhist school proposed that consciousness is a series of discrete moments. Atomistic moments pass out of existence as soon as they originate. These moments succeed each other so fast that they lead us to perceive temporally extended phenomena (Ronkin, 2018).

There are some complications to the cinematic view. Psychophysical findings don't offer clear proof. Just because visual perception or any other kind of perception is discrete, doesn't mean that our temporal consciousness itself is discrete. Perception is just one form of consciousness, as we've seen. We may have continuous aspects of consciousness even when other aspects are discrete. For example, let's say you do hear discrete instances of A A A A A A. Other forms of consciousness may be continuous during this period. Maybe

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[49] However, they propose a minimum increment of 400ms for any percept to become conscious. This isn't in line with certain other findings. For example, Eagleman and Sejnowski (2000) found it took 80ms for a percept to become conscious. Herzog et al.'s figure requires interpreting the data in a way that doesn't fit with phenomenological findings. So we have to be skeptical of phenomenological claims coming from this interpretation.

Also, note that Herzog et al.'s latest model (2020) is conceptualized somewhat differently, and isn't dubbed cinematic but "discrete retentional" (p. 827).

you're feeling the melancholic intensity of the note—and maybe this feeling is continuous, not divided into discrete chunks.

The cinematic view also has trouble explaining conscious impressions of succession, duration, persistence, and change. William James writes, "A succession of feelings, in and of itself, is not a feeling of succession" (James 1890/1983, p. 591). Dainton (2018) argues that even the metaphor of watching a movie made of still images is flawed. In this metaphor, there's still someone *doing the watching*. There's an observer to lend the rapid display of still images the illusion of motion. If our very consciousness is composed of isolated moments, there's no separate observer to lend it the illusion of motion.

Also, the cinematic view poses problem if you subscribe to the *continuity thesis*. We saw that according to this view, our consciousness has no breaks in it. The cinematic model requires breaks in our consciousness. Some have argued that our consciousness does indeed include gaps. Strawson writes of consciousness, "It is always shooting off, fuzzing, shorting out, spurting and stalling" (1997, p. 421). Dennett likewise writes, "One of the most striking features of consciousness is its discontinuity – as revealed in the blind spot, and the saccadic gaps, to take the simplest examples. The discontinuity of consciousness is striking because of the apparent continuity of consciousness" (1991, p. 356).

We've seen before that our dDES data doesn't support either the continuity thesis or the discontinuity thesis in their extremes. Consciousness can contain gaps. But these are not as common as Strawson and Dennett argue. Still, for those who buy into the continuity thesis, the cinematic model of temporal consciousness can pose problem. Hence other approaches.

Retentionalism

According to this view, episodes of consciousness also lack temporal extension. Consciousness is composed of arbitrarily small instances. But this view diverges from the cinematic perspective in that these episodes contain temporally extended phenomena in their contents. Episodes contain representations of the recent past. For example, say you hear the melody A B C D. First you hear A. Then you hear B but still have retentions or memory of A. Then you hear C but have retentions of A and B. It's through these retentions that you can perceive change, succession, and persistence.[50]

Some proponents of retentionalism include Brentano (1988/2009) and Broad, in his later views (1938). Husserl (1928/1991) also argued for retentionalist scaffolding of experience. He called retentions 'primal impressions' or 'primary memories.' But he also added a new component—protentions. These involve anticipation of what's to come. So at each

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[50] You may remark that even a single note of a melody does have temporal extension. True, and that makes such formulations of the retentionalist view confusing. You could instead imagine the entire retentionalist scaffolding as unfolding within the space of a single note, with each momentary phase being arbitrarily small.

arbitrarily small moment, we have retentions of the past as well as protentions of the future.
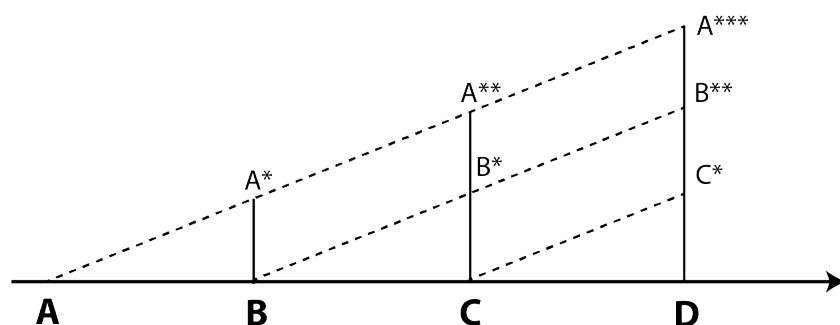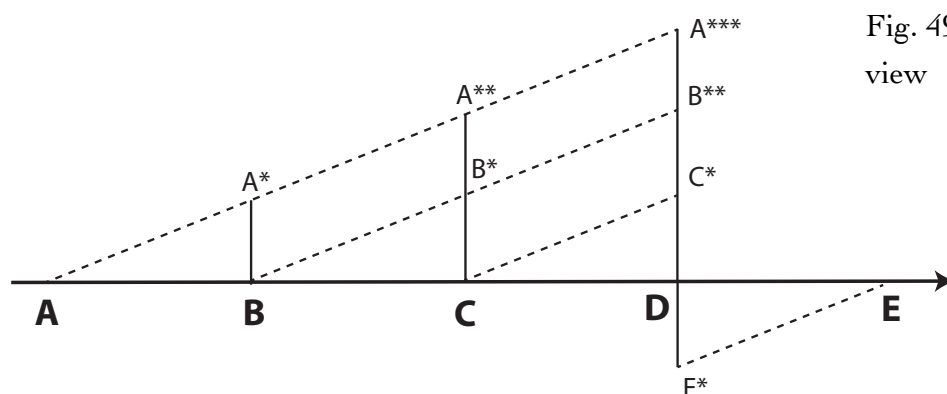

Fig. 48. Retentionalist view

Fig. 49. Husserl's tri-partite view

Husserl's tripartite structure has been taken up by phenomenological psychopathology (Fuchs, 2010). Fuchs argues that abnormal temporality in schizophrenia and depression results from disturbances of this structure. Attempts have also been made to tie this in with neuroscience (Vogeley & Kupke, 2007; Kaiser & Weisbrod, 2007). Husserl's model is often repeated uncritically (for example Northoff et al., 2018). It has been adapted as well. Varela (1999), for instance, adapts it to include extensionalist elements.

There are certain concerns with retentionalist models. For example, why aren't retentionalist components of consciousness experienced as simultaneous? If you have retentions of notes A and B while you hear C, why don't you hear a chord of A, B, and C? The answer need not be so complex. Perhaps retentions are somewhat different from direct experience in a way that evades simultaneity. Another question is, why doesn't experience get clogged with a surfeit of retentions? Again, the answer could be a simple one: old retentions could fade out of experience.

A more compelling concern is why our experience of change is as direct and vivid as our experience of, say, color (Dainton, 2000). To Dainton, retentionalism doesn't comply

with the phenomenological reality. When we perceive change, succession, and persistence, our perception is direct. Retentionalism offers only an indirect scaffolding of past experience.

Extentionalism

According to this view, our episodes of experience are temporally extended. They incorporate change and persistence in a direct way. Our consciousness is made up of successions of these chunks of experience.[51] Take a melody, A B C D. A and B might belong to one extensional chunk, and C and D to another. To Dainton, "No one denies that we experience change, so why would anyone be tempted to deny that consciousness extends some short way through time?" (2000, p. 132) Our consciousness can then extend to include more than one note of a melody in an experiential moment.

Fig. 50
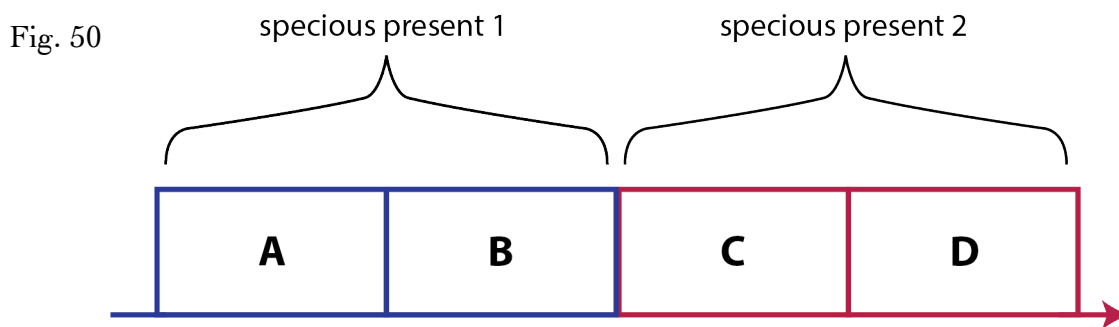
Robert Kelly who coined the term 'specious present' (under the pseudonym E.R Clay) recognized that if we perceive motion, then the contents of perception must span a temporal interval (Kelly, 1882; as cited in Andersen & Grush, 2009). So then our perceptual experience, itself, spans a temporal interval.

William James' views shifted but mostly he can be grouped with the extensionalists. He wrote that "In short, the practically cognized present is no knife-edge, but a saddle back, with a certain breadth of its own on which we sit perched, and from which we look in two directions into time." (1890/1983, p. 574) Unlike with the cinematic or retentionalist view, the present isn't an arbitrarily small moment. It has some breadth. James wrote that the specious present is *the short duration of which we are immediately and incessantly sensi-*

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[51] You can also use the terms realist and anti-realist (Dainton, 2018). Extensionalists and retentionalists are phenomeno-temporal realists because they see our temporal consciousness as mirroring physical reality, where events are extended over time. Change and duration are directly apprehended. Those following the cinematic view are anti-realists because they think we don't really perceive change and duration. These are illusory.

ble" (p. 594). He agrees with Kelly (1882) that all the notes of a bar of a song are contained in the present, and all changes of the place of a meteor are contained in the present.[52]

How exactly do we determine the units of these extensionalist moments? According to James, units of present experience are "groups of a few seconds" (575) but from psychophysical research, he gives a minimal length of 1/500 of a second (578) and a 'maximal length' of 12 seconds (577). So our consciousness consists of extended experiential moments of differing length.[53] Dainton estimates his specious presents to be half a second or less (2000, p. 171). So supposedly these lengths can be variable. They can depend on the person and the experience.

But the extensionalist model raises a few questions. What's between these extended blocks? Doesn't this view just run into the same problems as the cinematic view. Let's say you hear a melody A B C D. A and B are chunked together and C and D are chunked together. Why don't you just hear separate chunks instead of the whole melody? Dainton adapts the extensionalist model somewhat (2000). He prefers an overlap model. Various extensionalist chunks overlap with each other. One chunk might contain A and B. The next, B and C. The next C and D.

Fig. 51
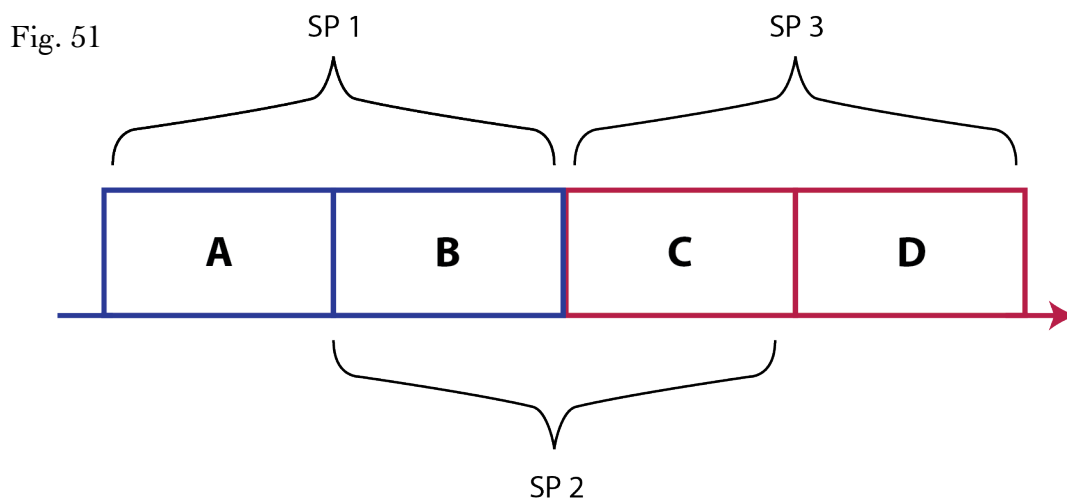
Phenomena in each chunk are 'co-conscious.' They are united by belonging to experience that is intrinsically temporally patterned (Dainton, 2010, p. 113). Different elements within experience are 'bundled' together (2000, p. 84).

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[52] One example of how divisions between retentionalists and extensionalists aren't always so neat is that for James, the specious present can include elements of retention such as visual afterimages or auditory echos. So even though James' phrasing is often used for extensionalist arguments, he isn't the clearest prototype of extensionalist thinking. And terms like 'the specious present' aren't exclusive to extensionalist arguments either.

[53] But James' view is somewhat inconsistent. At another point, he writes of a maximal specious present length of "not more than a minute" (603)

Dainton believes in what he calls the strong continuity thesis—that there are no gaps in experience, even between extended blocks (Dainton, 2010, 2018). He compares this to the modest continuity thesis where blocks of co-consciousness are continuous, but there may be discontinuity between these blocks.

There are still complications to extensionalist views. What exactly makes certain phenomena fall within one extensionalist chunk and not another? And do we have any empirical backing for this view? Much of the theorizing is done with armchair introspection (from James 1890/1983 to Dainton 2000, 2010). Researchers ask: what is my own experience like? Is it temporally extended? Does it have gaps? This doesn't just apply to the extensionalist view, but to the retentionalist and cinematic views as well. Theorists from Husserl (1928/1991) to Brentano (1988/2009) to Dainton (2000) have relied on the thought experiment: when I hear a melody what happens in my consciousness? Sure, researchers sometimes bring in psychophysical and neuroscientific data. But any time this is extrapolated to account for subjectivity, this process relies on assumptions about inner experience. What happens when we question these underlying assumptions?

dDES and temporal consciousness

So now we've seen our three contestants. Which wins the Grand Phenomenology Coupe du Monde? I promised that dDES could address this question. And it can, but not directly. It's possible to adapt any of these models to dDES. But that's the key: they must be *adapted*. dDES research shows the contours and constraints that these models must fit to.

These models can address a finer scale than dDES does. Retentionalist and cinematic episodes of experience could be on the scale of milliseconds. But we must ask how these fit into the patterns that dDES reveals. Looking back at Chapter 8, we see some of these patterns—Emerging, Disappearing, Overlapping, Transforming, Switching, etc. How can we adapt extensionalist blocks of experience, retentionalist scaffolding, or cinematic segmentation to these dDES patterns? Let's look at a case study with the transition Cross-fade.

Fig. 52. Cross-fade
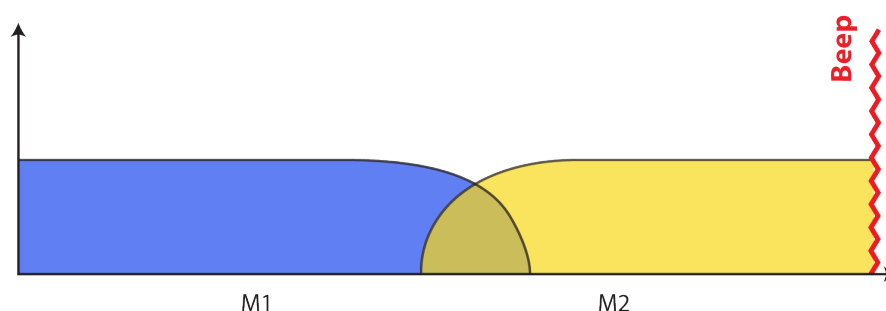
Recall, this transition is where experience from M1 fades out while experience from M2 fades in. There's time where both overlap. How would the cinematic model deal with this transition?

Fig. 53. Cinematic
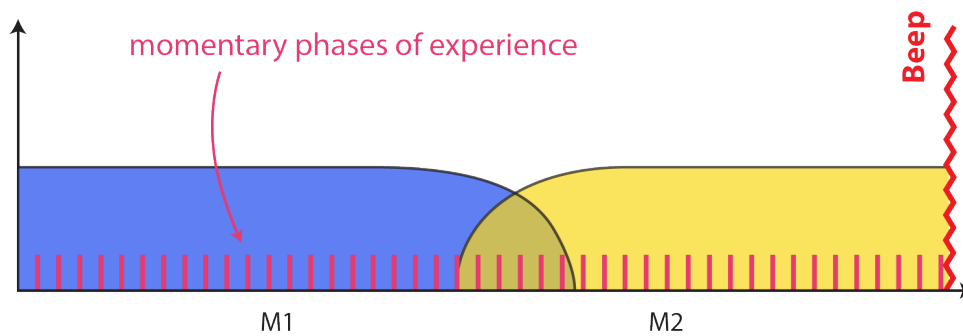
As we see, the cinematic model relies on isolated moments of experience. They aren't connected to each other. But if they come fast enough, then change and succession become perceivable—like a movie composed of still frames. We can see that these 'frames' could fit into a Cross-fade transition. Some frames would include aspects of the M1 experience. Some frames would include aspects of the M2 experience. Some frames would include both. So this model could fit with dDES, but concerns over how duration, change, and succession are directly perceived still need to be addressed. How would the retentionalist model fare?

Fig. 54. Retentionalist
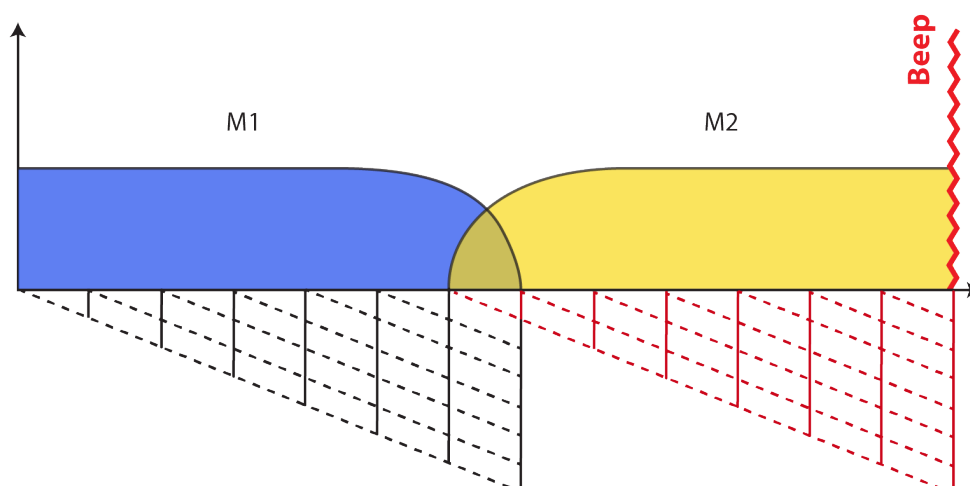
Retentionalist scaffolding needs to fit to our dDES pattern. This is a bit tricky. Scaffolding for the M1 experience is simple. We can uphold the traditional pattern. Moment B has a retention to moment A.[54] Moment C, retentions to moments A and B. It becomes a tricky when we bring in M2. Could there be two retentionalist structures that overlap for a bit? Or one structure whose elements shift? It's difficult to say. Retentionalist scaffolding becomes awkward when applied to this transition and others. How does the extensionalist model hold up?

Extentionalism is easier to fit with DES and dDES. With extentionalism, after all, experiential moments extend over time, just as moments extend with DES and dDES. So for a Cross-fade transition, the M1 element could be one extensionalist block and the M2 element could be another extensionalist block. Since they overlap, this would favor Dainton's preferred overlap model.

For some dDES transitions, it's harder adapting extentionalism. For example, take the transition Transformation. Here, an element in M1 shifts to a different one in M2. But there's still continuity between these two moments. How does extentionalism work here? The overlap model could be adapted. Perhaps blocks of co-conscious experience are quite small and a number of them overlap within this one transition. Still, the question of what exactly makes up a block of co-conscious experience remains, lest these become arbitrary constructs.

Fig. 55. Extensionalist
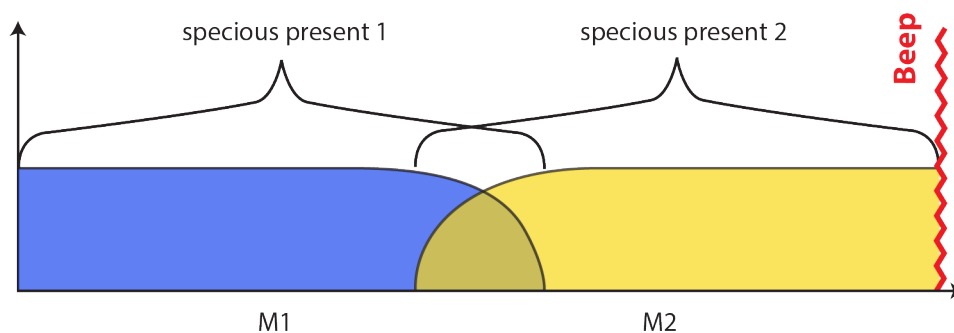
[54] You could think of moments A, B, etc. as smaller sub-moments within M1 or M2.

So we've seen that these models could be adapted. But they have to account for the patterns and dynamics that dDES reveals. Internal mechanisms—be it cinematic 'frames,' retentionalist scaffolding, or extensionalist blocks—have to adapt to different transitions. And crucially, temporal consciousness is different for different people. We saw that Max had frequent Overlapping. Nora had frequent Switching. Adrien had 'smooth jumps' and harsher Interruptions. Matej had unique experience, including the transformation of highly localized elements. Ali had Rapid fluctuating awareness. Models of temporal consciousness must account for this variability. Right now, these models of temporal consciousness are based on scant phenomenological data. Once we bring in more rigorous data, we find that existing models fit awkwardly.

For example, take the experience of hearing a melody. Much of the phenomenology so far is based on armchair introspection of what it's like to hear a melody. This kind of "lone-wolf autophenomenology" (Dennett, 2003, p. 23) has been the basis for models from Husserl (1928/1991), to Brentano (1988/2009), to Varela (1999). It has an outsized basis in theorizing. But what is the actual experience of hearing a melody? Of course, there are actually countless such experiences. But let's look at some examples that dDES reveals.

Adrien Sample 5.3

<u>Moment 1</u>: Adrien is watching a video on his phone. It's of a man playing piano. The keyboard is on the bottom and notes arrive as colored bars. They are played once they hit a line.

At this moment, Adrien is looking at the colored notes arriving. There's no sound yet. He's concentrating on the image. Concentration structures the visual element.

Adrien is also "wondering" what the sound will be like when the notes hit the line. There are no images or words to this. But there is a sonic quality. It's of imagining a sound, with all the particularities of a sound, but with something missing, the aspect of actually hearing it. It's low-pitched and sizzles. But again, it's different than if he was actually hearing it, or innerly hearing it. This sonic part is the "wondering." <u>Coding</u>: Soundless inner hearing, perceptual awareness

<u>Moment 2</u>: Adrien is watching the video. He can see the notes come and make sounds once they hit the line. This visual element is in his experience, but it isn't so present. It's also tied to the auditory element.

The rest of Adrien's experience is focused on the sound. He's concentrated on it. He hears the sound but not the particularities of it (these come in later, after the beep). He describes it like looking at a text in a foreign language. After the beep, he knows the language and can understand it but not before. He says, "If I had died at the moment of the beep, I wouldn't have been able to say that I experienced what it sounded like." <u>Coding</u>: Hearingless sound, perceptual awareness

<u>Temporal</u>: The transition between moments happened when the music entered. The thought switched to the listening. This was quick, but not brusque. The looking element partially became the looking part in Moment 2 but also merged into the listening element. The concentration aspect stayed the same throughout—it transferred in a continuous way. So in M1, the concentration aspect was the visual element, and in M2, the concentration aspect encompassed the seeing and hearing. <u>Coding</u>: Splitting, Disappearing

Fig. 56
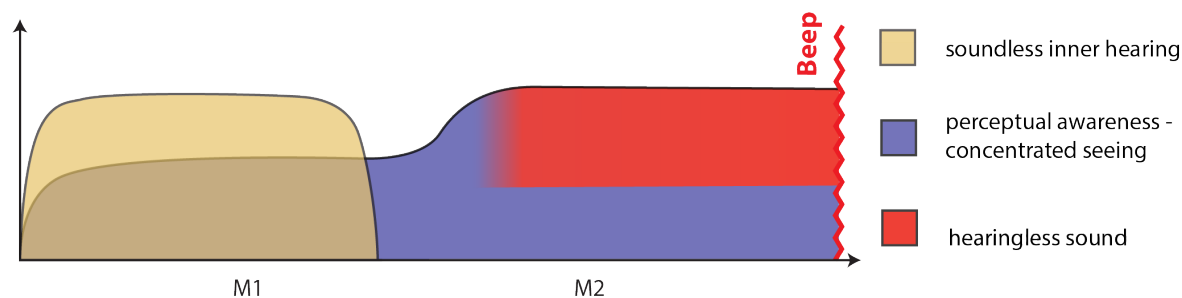
So in M2 we do have experience of hearing a melody. But this is hearing without sonic qualities. Adrien said that if he died at that moment, he wouldn't have been able to say what it sounded like. Who knows when the actual experience of sound comes in. It might have come gradually, or all at once. We can't say, since this moment was disturbed by the beep. But in sum, we have experience that doesn't fit neatly with any models. It doesn't fit presuppositions of the experience of melody that past theorists have used as basis for their models. For example, how would you adapt retentionalist scaffolding here? With 'sound-less hearing' and 'hearingless sound,' perhaps you don't have any retentions at all. Perhaps models could somehow be adapted to fit this sample. But again, they must be *adapted*.

We have another example of an experience of melody that bucks presuppositions. This is Max's Sample 4.1 where in M1 he's sliding his hand up his guitar and in M2 he hears the decay of a guitar note. But he doesn't actually experience playing the note. There's time between M1 and M2 with no experience. We saw that other samples include this 'Buffer.' Gaps of no experience occupied 3% of all transitions—a small but non-negligible amount. This transition goes against the continuity thesis, that there are no gaps in consciousness (Dainton, 2018).

We haven't entirely ruled out the continuity thesis. Since dDES acknowledges that there are aspects of experience it can miss, there still might be faint experience for Max's sample and other samples involving a Buffer. But dDES and DES samples of gaps without experience leave enough doubt that the continuity thesis can't be used as a priori justification for theorizing. Much of Dainton's rationale for discarding the cinematic model of consciousness (2018) or the non-overlapping extensionalist model (2000) is then gone.

So far, the continuity thesis has been justified with data from armchair introspection. Theorists ask themselves, "does my consciousness have any gaps?" But as we saw, it's risky for one person to self-initiate, choose, and interpret the experience investigated. There's a simple answer to why many theorists discard the possibility of absent experience: *we're not likely to remember* times when we were absent of experience. As an analogy, I was once getting my wisdom teeth pulled out and was given general anaesthetic while Pink Floyd's "Comfortably Numb" played in the background. The dentists kept hacking away with scalpels and I wondered why I wasn't drifting off. I was terrified it was one of those

cases where anaesthetic doesn't work and I have to undergo the whole surgery conscious and in pain (like an episode of *Nip Tuck* I saw). Soon, the dentists paused their hacking and I was able to move. I asked when the surgery was about to start, only to be shocked by the answer. It was already over. My mind had smoothed out periods without consciousness to give the impression of one gapless flow. I couldn' even tell that there was time when I was unconscious. Something similar could hold for our sober experience, our minds smoothing out the gaps. We could have periods without consciousness, only to be completely unaware of them. For reasons like this, memory demands are an issue for experience research. dDES and DES rely on a beeper to minimize these demands.

Armchair introspection might be able to access existential truths but not universal truths (in logic, you could compare to statements using the $\exists$ quantifier vs. statements using $\forall$). At best, it can lead to statements like 'there exist mental states such that x.' But it cannot lead to statements like 'all mental states are such that x.' With armchair introspection, you can say *'it's possible* for someone to have a seemingly gapless flow of consciousness under anesthesia.' But you can't say *'everyone* has a gapless flow of consciousness under anaesthesia.' You can say *'it's possible* for someone to speak to themselves in their heads.' But you cannot say *'everyone* innerly speaks to themselves all the time.' To say that all mental states are absent of interruption is a universal statement, and one that armchair introspection is incapable of making.

<p style="text-align:center">❀❀❀</p>

dDES data is more reliable than data from armchair introspection. So where does that leave us? We've seen that all three models could potentially be adapted to dDES data. But which model actually wins our Coupe du Monde? I think further research is necessary to answer this. Consciousness research is still in its infancy. And continued use of dDES will be a useful tool

But what's my take on which model holds? None of them really. Experience might not fit into any excessively regimented model. We've seen that experience can consist of a variety of temporal dynamics. On an even finer scale, we might see another range of temporal dynamics. There could be a vast array of temporal patterns, rather than just one. Our reality is built up through our living in the world, and so too our sense of time. So the experience of hearing a melody may not need some mechanical scaffolding of retentions. There may be no retentions, or retentions to melodies heard days or years ago.

Take, for example, Matej's Sample 2.2, with an experience of speed. Matej experienced the speed of the Libet task. He described this like being in a video game car race and accelerating suddenly at the start. But he insisted this wasn't a metaphor—it *was that exact feeling*. You could call this a retention, but it's not to an element directly prior, as with Husserl's model (1928/1991). And it's not just a memory either. The video game experience is

an intrinsic part of Matej's sample experience. Husserl dubbed retentions 'primary memories' and this term could apply equally to Matej's impression of speed. So this fits Husserl's definition of a retention while nonetheless being quite different from what he described since it's not of the recent past.

We see that patterns of experience can be quite different from those predicted by existing models. I'm not saying to abandon any quest for patterns in temporal consciousness, just that these patterns may be as shifting and variegated as our lives themselves. Some could last a few milliseconds, others seconds. They can overlap, interrupt each other, transform, or cross-fade.

We can compare this to Friedman's view of our temporal experience (1990). He leans away from theories of an internal clock towards a view where temporal consciousness is built up through a history of action and experience. We can also compare this to an enactivist perspective. We build up our understanding of the world through learning, interaction, strategies, incentives, and goals. Even William James expounds on a view where movement and action organize our time perception in its earliest form. He writes that "a movement is a change, a process; so we see that in the time-world and the space-world alike the first known things are not elements, but combinations, not separate units but wholes already formed." (1890/1983, p. 585) These are very different paradigms[55] to converge on a similar conclusion—that it is movement, goals, and interaction with our lifeworld that form the basis of our temporal consciousness. And so a model of temporal consciousness may not be a neat scaffolding. If there is anything comparable, it may more like be a messy stew bubbling out of the cauldron of our action and experience.

From a neuroscientific perspective, you could compare this to Buonomano and Merzenich's (1995) model of time in the brain (see Buonomano, 2017, for a popularization). The authors look at various timekeeping regions of the brain but concludes that there's no central region. Rather, time perception lies in *neural activity itself*. Any neural sequence is extended over time and leaves a specific spatial code. The way the network evolves through time can code for time itself. The very function of a brain is as a timekeeping device. The ever-shifting array of neural patterns constitute the shifting array of temporal patterns that make up our lives. So here too, time is built up through our interactions.

dDES isn't bound to any one neurological theory. It isn't even a direct theory on the general structure of temporal consciousness. A model may need to account for phenomena on a smaller scale than what dDES investigates. But dDES findings point overwhelmingly

[55] The fact that Friedman (1990) is a representationalist and that the enactivist view is generally anti-representationalist shows just how different these paradigms are.

in one direction—towards variety. The temporal patterns of consciousness are often indistinguishable from the actions and events, physical or psychological, that undergird these patterns.

Another theory that I like for its elegance is that both the cinematic model and these larger temporal dynamics can be true at the same time. From one perspective, we observe these broader shifting temporal patterns. From another perspective, consciousness could be atomized. It could be a succession of knife-edge moments.

This is comparable to the wave-particle duality of light (or really the dual nature of any quantum entity). You don't say that light is a particle or that light is a wave. Rather, measured one way, light behaves like a particle, and measured another way, light behaves like a wave. Perhaps our consciousness too, measured one way looks like a string of particles, and measured another way looks like a mess of overlapping waves. Just a theory.

Where does all this conjecture lead us? It seems we've cherry-picked the best parts from three existing models. We have the atomistic divisions of the cinematic view, which certain neuroscientific findings bolster. We have temporally extended sequences from the extensionalist view. And from the retentionalists, some of these sequences can contain complex series of retentions and protentions.

Isn't this having our cake, eating it, and mushing it all together? Actually though, I'm not so beholden to any existing models. I don't think it's a good idea to try to fit dDES data neatly into them. For now, data show a rich array of temporal dynamics. New neurological and phenomenological data can fill in the gaps later. The codes and dynamics presented in Chapter 8 can form the basis for a new model, to be subsequently refined.

But does this model answer the question of how change, succession, and persistence can be directly perceived? It seems that we've taken away the point of a model—which is to create a simplified but explanatorily useful representation of phenomena. And perhaps DES hasn't yet answered the question. But it shows the contours that an answer must take. Perception of change, succession, and persistence must fit within the dynamics we revealed, of Cross-fading, Transforming, Interrupting, Focusing, etc. And yes, there can be gaps in our experience without any of these phenomena. And maybe sometimes we can even have temporally extended experience without change, succession, or persistence—for example Adrien hearing sound without any auditory qualities, without an experience of hearing a melody. These are just a few examples of the directions new models can take. And here we complete our haiku!

Each person unique
Different scale, different results
New models needed

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17. The physical and the psychological

So far, we've tried to keep things tight and stick to the data. But permit me a left turn in the next two chapters, while I pursue some theoretical loose ends in philosophy, physics, and even poetics. Warning: to some it may seem nutty, jumping between disciplines and throwing around speculations. But there's a reason for this madness, in that we know barely anything about consciousness. A mature science of consciousness is in its infancy. Unorthodox perspectives can help us explore the contours of where a mature science might lie.

Hurlburt and Akhter (2008) argue for a division of labor in consciousness science, with those who describe phenomena "firewalled away from those who theorize about the significance of those phenomena" (p. 1372). And perhaps this is desirable, but it's a prescription that I'll break from. I think theoretical work can help us better describe phenomena, and rigorous descriptions can lead to better theorizing.

Chang (2004) argues that theory and measurement co-construct each other. Irvine (2019) elaborates, "Measurement devices and protocols, calibration techniques, and interpretive frameworks ultimately rely on theory about the phenomenon being measured, and theories about phenomena are developed from the very same measurements (as well as other sources of empirical evidence)."

This is especially true for phenomenology. As we've seen, different methodological scopes give different results. And theorizing is necessary to understand the scope of respective methods. We have a variety of DES and dDES samples. But then we have to ask, what aspects of consciousness do these samples reveal? What do they leave out? What's their temporal scale? What's their epistemological foundation?

Still, in some cases, it's useful to mark off empirical descriptions from theoretical flights. Here I'll venture forth some speculations, which, if wished, can be ignored without tainting the attempt at careful observation presented so far.

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Let's first turn to the question of realism. Does our perception of time mirror the 'objective' world? For example, is the world really tensed into past, present, and future, like our experience is? Or is our consciousness a different beast, an abstract fiction. Even if our consciousness is part of the universe, that doesn't mean they follow the same rules. Past, present, future may be a creation of our minds and not an intrinsic physical reality.

As a popular quip goes: "Time is nature's way of keeping everything from happening at once." But is this flow of time specific to living organisms? Or is flow from past to future inherent to the fabric of reality? And what can we say about physical time based on temporal consciousness? Let's look at a few views on what kind of physical time exists.

The Block Universe - This is also called eternalism. Everything in past, present, and future can be said to exist equally (Stoneham, 2009). The universe could be conceived as a block of all things that have and will happen. According to this model then, tensed time is created in our minds and is illusory.

The Growing Block Universe - The past is a block where all things that have happened exist equally. The past and present exist, but the future does not yet (Earman, 2008).

Presentism - Proposed by St. Augustine (400/1991). The past and future exist only in the mind. The present is all that exists.

Maybe some day phenomenological data can help determine which of these is true. Dainton (2010) argues against presentism based on the continuity thesis and his overlap model. In *Time and Space* he writes:

> "It is often assumed that the only sort of empirical evidence that can further our understanding of time is of the scientific variety. As should by now be plain, this is a mistake. Scientific theories attempt to explain and predict the observed behaviour of material things, often by reference to invisible forces and entities; there is no denying that such theories can have important implications for how we think of matter, space and time. But we can also learn something about time by examining *experience itself*" (p. 120).

According to Dainton, phenomenology can tell us a thing or two about physics. Based on experiential data, we can eliminate certain models of the physical world. However, our research has called into question Dainton's data and interpretation. We've dismissed the continuity thesis as a viable theoretical foundation. So we can't offhand overturn presentism with our findings.

Depending on how people wish to interpret our findings, they may run counter to presentism. For example, we saw that experience does have temporal extension—variable patterns shifting over time. If you wish to take this extension as real, then our findings go against presentism. But if you wish to see this extension as an illusion—perhaps created by atomistic neurological processes—then our findings don't overturn presentism.

I'm less confident than Dainton that phenomenological data can have bearing on our physical conceptions of time. In fact, other phenomenologists are even more pessimistic. Husserl (1928/1991) writes, "One cannot discover the least thing about objective time through phenomenological analysis." (p. 6) I'm not sure avenues are fully closed off. But it does take substantial interpretation to say anything about objective time from phenomenological data. I see it as being able to add to discussions, but never providing any definitive coup de grâce.

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What other views are there for the relation between mental time and physical time? Like Husserl, Bergson also thought lived time was fundamentally distinct from scientific

time (1889/2001). The outside world could be measured in quantities; in inside worlds, only qualities exist. Human time is neither fixed nor regular.

A quote adapted from Paul Coelho (2016): Time is not a measure but a quality. Time here is something subjective, existing in our minds. According to a quote attributed to Einstein, "Time and space are the modes by which we think and not conditions in which we live" (although probably misattributed, taken from a paraphrasing of Einstein's thought in Marianoff & Wayne, 1944, chapter 8, para. 22). These perspectives add up to a view of time as something we create. It's a shared hallucination that we impose on the world around.

But do we create time or sense it? Could you think of time like other senses, like sight and smell? We've seen the argument that time is created and not an intrinsic part of the world. But you could say the same for color. There exist certain electromagnetic frequencies, but color itself doesn't exist as an intrinsic reality.

But perhaps time perception is even less direct than color perception. A certain frequency will produce a certain perceptual experience (which is of course isn't constant and is subject to illusions). The physical corollary with time is the state of entropy in the world, which we're not perceiving as such, but through variation in phenomena and entities. We can see a vase fall and shatter. We experience time through this—duration as the vase hangs in the air; change as it breaks. Does it make sense to call this a sense, like color? An answer will ultimately depend on how we draw the lines of our definitions, so let's leave it at that or now.

But let's continue with the question: Can we ever really directly experience time? From studies with infants, it takes quite some time to acquire understanding of time (Piaget, 1927/1969; Werner, 1957). Perhaps it is not something we can directly experience but only understand relationally. We start with various moments of our lives, spread out over time. We learn how those moments relate. We learn how the vast network of these relations form something we can conceptualize as time.

There are hardly any DES samples of direct apprehension of time. But there are a few. In Sample 2.4, Ali is high, untangling wires, and experiences time as moving slowly. In Sample T2.2, Matej is experiencing speed. It's like playing a racing video game. And this comparison goes beyond the metaphorical. *It is that exact feeling*. This sample shows the relational nature of time, at least at this moment. The impression of speed is created through memory. A past spatiotemporal experience of accelerating forms a current experience of speed.

In some conceptions of physics, time is relational. It's not a necessary variable to describe the world. Instead what's needed is a description of how entities vary in relation to

each other (see DeWitt, 1967; and Rovelli, 2018 for a popularization). Perhaps in a psychological sense too, time is relational, built up through patterns of interaction with the world.

But is there any structuring of our mind that allows time to be built up a certain way? To Kant, yes. Temporality and spatiality are built up according to a priori structures (1781/1998). They are ingrained as preconscious organizing features of the human mind. However, these structures are empty intuitions in and of themselves. Only by perceiving things in the world do we build up these structures. Poletti (2017) interprets Kant arguing that "the properties that we can assign to the object are nothing but the very preconditions for knowing the object itself, overturning the relationship between the knowing subject and the experienced object" (p. 107). So understanding of time is part of our minds. Think of our temporal understanding like a cake mold. This mold itself is empty. We fill it with dough by interacting with things in the world. And the properties we assign these things are informed by the very shape of the mold we started with.

How does this manifest physically? We can update Kant with our current best understanding of the mind and brain. We saw in the introduction that certain brain regions are involved in time perception e.g. areas in the hippocampus also used to process space (Kraus et al., 2015). Perhaps we have certain ingrained ways of processing time, and our contact with our life-world builds up the rest. Our a priori structures determine the relational patterns we use to build up those structures over the course of our lives. So our understanding of time is not based on a rigid physical entity but on something constructed through a combination of the predetermined makeup of our minds, and our history of temporally extended interaction with the very thing we are defining.

Let's recall another iteration of this theme of our consciousness defining time. We saw that our consciousness is extended over time. But also that time itself may owe its extension to our consciousness. Time in the universe may not be intrinsically ordered from past to future, from low to high entropy. This may be how the universe looks to us because it's the only ordering that allows for subjectivity. To form memories and act, life must progress from low to high entropy. So we understand the universe as temporally extended because it's the only kind of universe that allows for understanding in the first place.

Time orders consciousness. But we've seen variations on the theme of consciousness ordering time. Is time something we perceive or something we create? Or perhaps lines between perception and creation have to be erased entirely.

There are other ways of conceptualizing relations between living systems and entropy. In his book *What is life?* Schrödinger (1944/1992) writes that life feeds off of negative entropy. The goal of living systems is to reduce entropy as much as possible, so that we stay contained organisms, instead of shapeless masses of heat and protoplasmic jelly. So even as our consciousness functions in the direction of increasing entropy, we as organisms are

trying to minimize our entropy (see also Karl Friston's Free Energy Principle, e.g. 2010). In a way, you could think of us as trying to suspend the tides of time, to put off our death for as long as possible. This minimization of entropy is imperfect, and so the direction of our consciousness aligns with our crumbling body as it washes away towards death.

<center>❋❋❋</center>

This link (or is it a chasm?) between the physical and the psychological fascinates me. We've already examined some treatments of this link, be it Kant's (1781/1998) view of a priori structures shaping our perceptions, Dainton's (2010) view that phenomenological data can help us narrow down possibilities for physical time, or Husserl's (1928/1991) view that the phenomenological can tell us nothing about the physical.

What comparisons can we make specifically regarding DES/dDES and our current best understanding of physical reality? Schwitzgebel voices skepticism about DES since it doesn't always comply with physical reality (Hurlburt & Schwitzgebel, 2007). For example, in one sample Melanie hears repetitions of inner speaking, with these repetitions being nearly instantaneous one after the other. Still, they don't feel sped up. To Schwitzgebel, it's a knock against DES that results don't always conform to our understanding of reality. But *which* reality? Because with relativity and quantum physics, there are quite a few comparisons you can make.

Relativity and consciousness

According to special relativity, for example, two observers may experience the same event differently depending on their frame of reference (Rindler, 2006). For example, a moving clock will tick more slowly than an observer's stationary clock. Two events, simultaneous for one observer, may not be simultaneous for another observer. Imagine someone shooting two bullets at two panes of glass to both sides of her on an ultra-fast-moving train. For her, the two panes of glass break at the same time. But to an observer on the hillside, one pane breaks before the other.

With inner experience, you can also get different results for different frames of reference. For example, the DES interviewer can't judge how fast the interviewee's inner speech *really is*, only how fast it *appears* to them. Let's bring in our Phenomotron3000, hooked up to the interviewee's neural activity, projecting inner experience through a loudspeaker. The speed of inner speaking could be completely different for the interviewee and interviewer. Melanie's inner repetitions were nearly instantaneous one after the other. But they didn't feel sped up. Hook her up to the Phenomotron3000 and listeners will observe rapidly sped-up speech.

Our participants also noted this relativism. Adrien described how long his samples felt while acknowledging that their actual extension in physical time may have been different.

Clara noted her speed of inner speaking was normal, even though others often characterize this same speed as fast. Hurlburt et al. (2013) argue that we can sometimes infer that speed *must* have been different for two observers. For example, "Willis was innerly saying 'What a jerk! I hope I never see that idiot again!' while simultaneously slamming his book shut. The speaking was apprehended as taking place entirely during the same time interval as the real book was slamming shut, and yet the speaking was apprehended as occurring at a normal pace. That is physically impossible but experientially natural" (p. 1484). Here we can use a physical event to infer the duration of a mental event. Willis's entire inner speech fits into the time it takes him to slam a book shut. To him, it doesn't feel sped up. But again, hook him up to our Phenomotron3000 and to observers it'll be faster than Aaron Sorkin dialogue.

Relativism also came up regarding mental images. When I asked Eva if mental images in certain samples were detailed, she replied that they weren't. But she went on to describe these images with a good deal of clarity and detail. Other participants (Adrien for instance) might have described a similar mental image as detailed. For the researcher, determining level of detail involves creating a heuristic mental average of all other participants sampled. From this perspective, Eva's mental images were detailed. But from her own frame of reference, they were not.

The topic of relativity recalls another problem. You probably know of the inverted spectrum problem (Shoemaker, 1982). What if what I see as green looks like red to you, and what I see as red looks like green? A comparable problem exists with time. What if my rate of flow is faster than yours, or slower (Lee, 2017)? This is the question of "strong phenomenal variation" (p. 167).

Can we determine this from DES/dDES samples? Not directly. We do have samples where time is passing faster or slower. For example, Ali high and untangling wires. But presumably, this impression of slowness comes from comparing this experience with his normal experience. He's not comparing it with the experience of others. And we can't infer from this sample anything about Ali's rate of consciousness compared to others.

We also have samples where mental events occur quickly—for example, Ali's Rapid fluctuating awareness. But do physical events occur at different speeds to different people? Does watching a vase fall to the floor and break occur at different speeds to different people?

We know that some disorders alter the subjective rate of time. Take for example Alice in Wonderland syndrome (Blom, 2016). This disorder involves distortions of perception such as inability to perceive motion, or such as acceleration or deceleration of psychological time. This could mean walking and having everything around you slow to a freeze and then accelerate rapidly. A total absence of feeling of time is also possible (Blom, 2020).

So we know that variation in duration experience exists. But here again, perhaps this variation still requires intrasubject comparison. For people with Alice in Wonderland, time may speed up in comparison to other occasions when it passed slower. But if someone has the roughly same rate of flow since the time of birth, whatever that rate of flow, wouldn't it just seem normal? Would it even make sense to compare to another person and say their rate is slower or faster?

First off, it would be an oversimplification to say there's one rate of flow. According to most models, temporal perception relies on a wide array of mechanisms. There are different mechanisms for different modalities (auditory and visual for example). Time consciousness changes at different stages in development. Perhaps rate of flow is different not just for every person, but for every action, every moment. Perhaps there is no one thing to be called rate of flow.

But what happens if we work with the assumption that despite these differences, we can still draw comparisons. Lee (2017) uses the example of a hummingbird for whom the experience of a 500 ms flash might be comparable to a human's experience of a 2-second flash. Perhaps differences like this occur between humans. Lee uses the example of a person for whom, by some fluke, all neural firing is faster.

We've seen throughout this thesis that there can indeed be variability in temporal consciousness. It's not outlandish to say there could be variability in the rate of flow. But this may not translate to variabilities in subjectivity that are directly comparable. Lee talks of comparing 'quality spaces' of subjective experience. I'm unsure if quality space is a useful conceptual tool here. This may be strange for a thesis that's all about comparing experience. But this research relies on distinguishing which entities are comparable and which ones aren't. Fast rate of flow may not lead to a subjective experience of things happening fast. By comparing subjectivity in the same 'quality space' you might create this comparison—you might be able to say, 'hey this person's consciousness experience here is much faster than this other conscious experience'—but this kind of comparison is not something that exists intrinsically in any consciousness. Putting things in a quality space to compare may create arbitrary constructs that don't exist in consciousness.

Hence the comparison with relativity. These questions may depend on frame of reference. To say that one person has a faster rate of conscious flow than another requires making a comparison. But this imposes something not present in experience. By taking the frame of an outside observer comparing subjectivity, we get different results than from the frame of either of these subjectivities.

And perhaps we can only judge rate of flow when it shifts from implicit time consciousness to explicit—for example, Ali untangling wires, and thinking that time is passing slow. These instances may exist through comparison, with people comparing experience at a certain time to previous experience. In sum, I think it's quite possible that there exists "strong

phenomenal variation" and also that phenomenology is unable to access this variation. Any kind of comparison would impose something not intrinsic to consciousness itself.

So we've seen examples of how metaphors from special relativity can be applied to consciousness. Understanding mental events depends on our frame of reference. We can't judge how fast inner speech really is, only how fast it appears. Only sometimes can we infer speed based on external observables—e.g. a book slamming shut. Speed of mental events may be different to a participant and to someone listening to the Phenomotron3000. Level of detail of mental images might be described differently by the participant and the researcher. And rate of flow may not be directly comparable across participants.

Quantum physics and consciousness

Now let's leave the shifting sands of relativity for the murky waters of quantum physics. There are many quantum theories of consciousness, none proven. Orchestrated objective reduction theory postulates quantum effects in the microtubules of neurons (Hameroff & Penrose, 1996). Although follow-ups show that certain components required for quantum effects don't function in the way that Hameroff and Penrose hypothesized (McKemmish et al., 2009). Simplified, the brain's probably too warm and wet for quantum effects. The Pribram-Bohm hypothesis proposes consciousness arising from an 'implicate' quantum order to an 'explicate' order of time and space, like the information of a hologram emerging to form the visual display (Bohm, 1973; Pribram, 1991). These ideas haven't found their way into mainstream science and some followers pursue them in a pseudoscientific way, for example hypothesizing consciousness arising in the ventricles of the brain, not the neurons (Joye, 2016).

But so far, all these theories are about the *mechanisms* of consciousness and not about the *content* of consciousness. They're about our neurons, not our subjective states. So let's draw out some comparisons between *contents* of consciousness and quantum physics.[56]

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[56] There's another intriguing theory on the relation between our minds and the world—the 'many minds' interpretation of quantum mechanics (Albert & Loewer, 1988; Lockwood, 1996). This is not so much about the *mechanisms* of consciousness, but about how these *mechanisms* relate to *contents* and how these *contents* relate to the physical world. According to this theory, an infinite number of mental states can correspond to any physical brain configuration. They exist in what you could call a 'multiverse' of possibilities. We can call this vast range of possible mental states a "multimind" (Lockwood, 1996, p. 177). We can think of time as extending in another dimension to encompass this plurality of possibilities. This is an explanation of the measurement problem in quantum mechanics. A quantum entity is described by a wave function of possible states. But any time we make an observation, there is a 'wave function collapse' and we observe just one state. And what happens to the other states? According to the many minds interpretation, the collapse occurs in the interaction between observer and observed. The other mental states in the multiverse represent all other possible outcomes of the wave function. So the wave function never actually 'collapses.' Different possible mental states just offer different outcomes, determined by the respective probabilities of these outcomes.

This theory bears resemblance to the many-worlds interpretation of the wave function. And according to Lockwood, it actually conforms to Everett's (1957) original description of what only later came to be known as the 'many-worlds' theory.

First, you can make comparisons between quantum physics and the field of first-person research in general. Both are 'non-trivial domains' that entail observer effects (Kordeš & Demšar, 2019). The act of observation can change what's being observed. There can be no 'view from nowhere' without taking into account the observer.

In quantum physics, in the absence of measurement, the state of a physical system is said to be represented by the wave function. For example, the wave function describes the probabilities of positions of an electron. However, an observation results in a single definite outcome e.g. a single location for an electron. The observation changes what's being observed.

To Kordeš & Demšar, first-person research also involves this measurement problem. They don't specifically address DES, which uses a beeper and lengthy interviews in the attempt to mitigate observer effects. But to them, these effects are incontrovertible—a fact which any epistemology of first-person research must recognize.

Another comparison is with the Heisenberg uncertainty principle. You can't simultaneously know certain pairs of variables, for example both the momentum and position of an object (which becomes significant for small objects like particles). In fact, the very concept of exact position and exact velocity together has no meaning in nature. There's a tradeoff between how much you can know about the position and momentum. We can compare this to first-person research where there's a tradeoff between the synchronic richness of a description and the diachronic richness. So there's a tradeoff between how much detail you can get for experience at a specific moment (position), and how much detail you can get about experience as it evolves over time (momentum). Say you get a perfectly detailed description of experience over the course of a single second (so detailed that a write-up takes 1000 pages). It may be impossible to use these means to describe experience as it changes over the course of a minute. Perhaps this tradeoff isn't a theoretical necessity, as with the uncertainty principle—but it has certainly manifested so far, with certain methods like DES aiming for detailed moments, and others like micro-phenomenology skewing towards detailed change over time.

Another comparison we dealt with in the preceding chapter—that of particle-wave duality. Observed one way, quantum entities behave like particles; and observed another way, they behave like waves. Take, for example, the double-slit experiment where particles are shot through two slits, against a screen. You can shoot, say, an electron through and observe the discrete point on the screen. But shoot more through and you'll see a pattern—of crests and troughs based on interference from the two slits. This is a pattern characteristic of waves. Counterintuitively, you'll even observe this pattern if you shoot one electron

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The many minds theory is intriguing in the degree to which it links consciousness and time. Consciousness becomes responsible for creating a number, and possibly an infinite number, of timelines. Consciousness becomes as responsible for forming time as time is for forming consciousness.

at a time (Merli et al., 1976; Rosa, 2012). Each electron interferes with itself, demonstrating its dual particle-wave nature.

Similarly, I speculated that observed one way temporal consciousness was cinematic in nature, and observed another way it was extensionalist. Looked at one way it could be composed of atomistic isolated moment, and looked at another way it could only be described with broader temporal patterns. This isn't just the case of being able to describe experience in two different ways. It's that these two descriptions are seemingly incompatible. Is consciousness atomistic? Or is it extended? Seemingly one would preclude the other. But perhaps this is not the case.

The next comparison we're going to pile on is with quantum superposition. Quantum entities can be in two states at the same time (Silverman, 2008). For example, particles can be both in an excited and non-excited state. We can compare this to phenomenology, where inner experience can seemingly involve two states at once. For example, take imageless seeing, wordless inner speaking, and wordless inner hearing. These are unitary phenomena—imageless seeing is one element and not two separate ones. Still, any attempt to describe these phenomena entails describing two seemingly contrasting phenomena. Seeing, but with a lack of images and visual information. Inner speaking, but without words or auditory qualities. Any attempt to describe the phenomenon in question involves splitting it into two phenomena where an attempt to describe one aspect moves us further away from a description of the other aspect. Our vocabulary hasn't been calibrated with the phenomena of consciousness. Consciousness and communication remain different systems. Changing frames from one to another causes incongruity.

Let's take a step back. I wasn't being so rigorous in my description of quantum superposition. Can quantum entities really be in two positions at the same time? The more rigorous explanation is that if two wave functions can be the solution to our equation, then a combination of these wave functions can be a solution. And what's happening with the particle? According to the Copenhagen interpretation of quantum mechanics, in the simplest terms: don't ask. By this interpretation then, quantum physics is more about how we relate to information than it is about the state of the world itself (Stapp, 1972).

But this new approach—thinking about how we relate to information—also works with the comparisons we've made so far. All three of the comparisons we've made address how we relate to information, and how we relate to the phenomena of consciousness, as much as they address the contents of consciousness themselves. We saw that observation of these phenomena could affect them. We saw that there could be a tradeoff of richness based on the kind of description we wish to obtain. We saw that observing these phenomena in different ways could give different results. And we've seen that any attempt to describe certain phenomena involves using words that describe seemingly contrasting phenomena.

We can also expand our superposition metaphor to address decoherence. You stop seeing superposition the more interactions a quantum entity has. For example, if other particles are bouncing off of it, it will stop being in two simultaneous states. This is why you don't observe quantum effects on a macroscopic scale.

This decoherence metaphor could be applied to consciousness. Phenomena like imageless seeing and wordless inner speech are strange because we're not used to communicating them. Adrien notes about his imageless seeing, "yeah it's really hard to describe. I think we're lacking words in our vocabulary."

We don't have stable ways to communicate inner life. Perhaps if we talked about it more, we'd come up with new terms and ways to explain it. Perhaps 'imageless seeing' could be described in one word rather than two seemingly contradictory words. There would be 'decoherence' as we interact with our environment. But for now, consciousness is a subsystem within the larger system of our environment, which doesn't always have so much interaction with this supersystem.

In fact, disconnect between our consciousness and the environment has also been argued mathematically. According to Chang et al. (2020) our consciousness exhibits 'non-trivial informational closure.' Of course, there is some information flow from the environment, but before it becomes conscious, it undergoes what the authors call neural 'coarse-graining' (a sort of inexact error-robust mapping) so that what we're conscious of is different from the environmental information flowing in. The authors further posit that any non-trivially informationally closed process is conscious.

To use my own metaphor, think of consciousness like parliament full of politicians. And think of individual neurons as the people they represent. While politicians do have some relation to the people (they are voted in), they still are distinct and separate from these people. There is a relationship but it isn't always direct, hence the 'non-trivial' aspect of informational closure. Hopefully though our consciousness is more functional than our politicians.

I can't fully endorse the 'non-trivial informational closure' view here, but it is intriguing. You could relate this informational closure to a quantum system that hasn't undergone decoherence. Might there be a deeper connection between our minds and quantum theory, related to information? Maybe both realms could be seen as subsystems within a supersystem. Lack of direct information flow with this supersystem leads to properties not found in the supersystem.

There are other connections you could get carried away with. You can also make comparisons with causality. We saw two DES samples involving causality without temporality. In Sample 1.3 Matej's inner hearing caused calmness. But this calmness was at the same time as the inner hearing, not after it. Causality without temporality defies classical physics but is comparable to quantum mechanics where causality is not always straightforward.

With quantum superposition, there can be indefinite causal structures with simultaneous superposition of 'A causing B' and 'B causing A' (Brukner, 2014).

The absence/presence discussion from Chapter 14 calls to mind how nothingness isn't so simple. From our phenomenological data, we see that nothingness can have a presence in consciousness, for example Adrien's sample T1.2 where nothingness took up about 85% of experience. In quantum mechanics, a vacuum is not simply empty space. There can be quantum fluctuations in the void, where particles fleetingly pop in and out of existence (Riek et al., 2015).

For now, these are metaphors, let's keep it at that. But metaphors can become useful concepts. Relativity/relativism is a useful concept in fields far beyond physics, including anthropology, history, and philosophy. We also talk of observer effects in fields beyond quantum physics. Kordeš and Demšar coined the term 'non-trivial domains' (2019) to denote domains where observation can affect what's observed. Perhaps new useful concepts can emerge from the similarities we noted.

Perhaps we could talk about 'non-uniform domains,' where 'superpositions' are observed—where any attempt at defining one aspect of a phenomenon will necessarily take us farther away from a description of another aspect (e.g. imageless seeing). Or talk about informationally closed domains where if a sub-system lacks interaction with a super-system, it exhibits qualities not found in the super-system.

One of the most fruitful avenues for retooling these metaphors into useful concepts lies with 'complementarity.' Complementarity in physics pertains to any properties that can't be measured simultaneously. Our examples earlier of wave-particle duality, and the uncertainty principle regarding position and momentum both fall under the umbrella category of complementarity. Nils Bohr, one of the founders of quantum theory, who first proposed the term, actually intended it to be a broader epistemological category, extending beyond the realm of physics (Bohr, 1937). He even discusses the possibility of it applying to psychology. Bohr writes that the "difficulties of analysis and synthesis of psychic phenomena connected with introspection" remind us of problems in quantum physics (p. 297). This is exactly what we've observed. The tradeoff between diachronic richness and synchronic richness, as well as the potential for both atomistic and extensionalist properties of consciousness could very well be examples of complementarity. Complementarity applied to realms beyond physics is certainly a metaphorical extension but is it a metaphor useful enough to become an epistemological stance, as Bohr intended? The question remains open.[57]

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[57] Bohr's (1937) examples differ from ours. He writes that "the use which we make of words like 'thought' and 'feeling,' or 'instinct' and 'reason' to describe psychic experiences of different types, shows the existence of characteristic relationships of complementarity conditioned by the peculiarity of introspection." (p. 297) But even though Bohr uses different examples, they point to an interesting commonality with our findings—regarding the relationship between our consciousness and the words we use to describe it. Where we used the metaphor of superposition, Bohr uses that of complementarity.

There's certainly something pulling us lemmings off the cliffs of quantum consciousness. Both are mysterious and strange realms. By the "Law of Minimization of Mystery," perhaps we just want to find a common answer for these two mysterious realms (Chalmers, 1995, p. 207). But even if this answer is a metaphorical one, it can serve a purpose. John Updike (1967) argues that quantum metaphors are increasingly useful to address a reality that feels fragmented and troubled by chaotic interruptions. Quantum language and imagery heighten our sensitivity to the "gaps, inconsistencies, warps and bubbles" of human experience (p. 51). Perhaps there's something to be said for the fact that our consciousness is supremely susceptible to these metaphors.

Quantum brain mechanics are also popular because they supposedly open the door towards free will, away from strictly deterministic firing of neurons. Although you could wonder how the misty air of probability is any better than the strict clockwork of determinism. In any case, most of the theories so far have revolved around the mechanisms of consciousness—neural activity. But perhaps the real parallels lie with the contents of consciousness.

I'll leave these questions open. For now, I think it's interesting that metaphors to both relativity and quantum physics can be drawn. Physics has struggled to unify these theories. Physics works because so far you don't often have to use both of these theories at the same time. But when you do (for example, when studying black holes), things break down. But both of these fields apply, at least metaphorically, in consciousness—the realm where the dream of the Theory of Everything comes true.

Subject and object

But let's return to the idea that consciousness is a totally separate domain—that all these connections are just the result of our pattern-finding brains desperately trying to find patterns. True, temporal consciousness could be something *completely* separate from the so-called 'real world.' It could be its own dream world with its own dream logic. In fact, it's not very phenomenologically correct to look for connections between the physical and the psychological. The point of Husserl's phenomenological reduction is to suspend any connections to the physical world. He writes,

> "We are concerned with reality only insofar as it is reality meant, objectivated, intuited, or conceptually thought. With respect to the problem of time, this means that we are interested in *experiences* of time. That these experiences are themselves fixed in objective time, *that they belong*

The demands of introspection and of finding vocabulary to describe inner life may lead to terms that are opposites. But then when using these terms to describe consciousness, we may run into dead ends. Consciousness may not always exhibit the same strict opposites that our language has evolved to demarcate. We've seen this with 'imageless thought' and 'wordless inner speaking.' As Bohr noted, we've also seen experience coded as 'thought/feelings' since neither of these terms apply individually. Perhaps there is some deeper relationship between observer and observed at play. Attempts to describe the observed may involve separating it into multiple variables which are incompatible with each other.

in the world of physical things and psychic subjects, and that they have their place, their *efficacy*, their empirical being, and their origin in this world does not concern us and we know nothing about it." (1928/1991, p. 9-10)

The link between subjective and objective time—we know nothing about it![58] Husserl's bracketing, as we've seen, is a useful tool for research. But once the research is done, the link between subjective and objective still calls out. We want to connect first and third-person methods. The siren song of the 'hard problem' of consciousness beckons us (Chalmers, 1995). Should we follow it? Should we venture even further, speculating relationships between our consciousness and the elementary physical laws of the universe?

But maybe the very thing that divorces the psychological from the physical could be what connects it. If our minds really are informationally closed, then the one thing that permits us a (metaphorical) connection with quantum decoherence is ultimately what separates our consciousness from it, from physical reality in general, since we're bundles of informationally closed sub-processes.

<p style="text-align:center">❈❈❈</p>

So we've seen a variety of views for how psychological time can relate to physical time.

There's Husserl's view that we can know nothing about this relation (1928/1991).

There's Bergson's view that the physical and the psychological are fundamentally distinct (1889/2001).

There's St. Augustine's view that the only time that actually exists is the time of the conscious present (400/1991)

There's Dainton's view that phenomenological time helps narrow down options for physical time (most importantly by excluding presentism) (2010).

There's the view attributed to Einstein that linear time is a construction of the human mind (Marianoff & Wayne, 1944).

There's the Kantian view that what we observe of physical time is determined by a priori structures of our mind (1781/1988).

There's my speculation that certain structural similarities between our mental world and the physical world permit comparisons that go beyond metaphor to become useful categories.

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[58] There's actually a bit of Ernst Mach's physics in Husserl's view. To Mach, we never perceive direct reality. There is simply no isomorphism between appearance and reality. For example, a color is "a physical object as soon as we consider its dependence, for instance, upon its luminous source, upon other colors" but when we consider its dependence on the retina it is a "psychological object" (Mach, 1897/1959, p. 17-18). However, Husserl's relation to Mach's thought is complex. While he was influenced, Husserl went even farther in divorcing the psychological from the physical (Fisette, 2011).

The question of how our minds relate to the world is one of the most complex. We might adopt different answers depending on different research goals. For example, when acquiring data, I believe Husserl's view is preferable. We bracket any connection between the mental and the physical. But once this data is acquired, we can allow our minds to start racing with possibilities. How mental time and physical time relate is one sub-question. The broader even more consuming question is how the mental and physical relate in general. It's funny that the term phenomenology also has a very different meaning in physics. It denotes the application of theoretical physics to making predictions to be tested by experimental data. So we have a phenomenology for the physical world as well as for the mental world. Is there any relation between these doppelgänger words or is it any conflation just a case of mistaken identity?[59] And what is the relation between the physical and the psychological?

From one perspective, philosophical phenomenology is a subset of ontology. Heidegger writes, "Only as phenomenology, is ontology possible." (1927/1985, p. 60). Ontology is about existence and what exists, whereas phenomenology is about one form of existence—consciousness. How do these two forms of reality relate?

— Panpsychists see all matter imbued with some degree of consciousness or proto-consciousness (Tononi & Koch, 2015).

— Dualists see mind and matter as fundamentally different, perhaps even composed of different substances. Consciousness might arise from the soul for instance. Chalmers's "naturalistic dualism" maintains this difference without invoking the spiritual, mystical, or any related substance (1995, p. 210).

— Devotees of a materialist conception see consciousness as an epiphenomenon of mechanistic workings (Hoffstadter, 2007; Dennett, 2001) As Francis Crick puts it, "You are nothing but a pack of neurons" (1994, p. 3). We no longer need to endure the "tedium of philosophers perpetually disagreeing with each other. Consciousness is now largely a scientific problem" (1996, p. 486).[60]

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[59] Although there was some confluence between the word 'phenomenology' as used by philosophers like Husserl and physicists like Mach in the early 20. century. In fact, it's not fair to apply the term 'philosopher' only to Husserl, since it was, after all, Mach who took the spot as chair for the history and theory/philosophy of the inductive sciences at the University of Vienna, a position which Husserl coveted (Fisette, 2011). This time period was one of surprising confluence between physics and philosophy, fueled by the ideas of the Vienna circle, which attempted to bring empirical rigor to philosophy and banish unfounded metaphysics. Some of the Vienna Circle's dogmatic views ran into dead ends (Sigmund, 2017). Communion between natural science and philosophy has perhaps never been as fervent since. Still, the Vienna Circle left its mark on philosophy, with influences that include this thesis.

[60] There are various theories for how this neural structuring occurs. See, for example, the Attention Schema theory whereby consciousness is the product of our brain creating a model of where our attention is directed at any one time (Graziano & Webb, 2015).

— Some, like William James (1904), prefer neutral monism. There's one kind of stuff in the universe—sometimes it's physical, sometimes it's mental.

—Karl Friston and colleagues (2020) propose what they call Markovian monism. The universe is composed of one kind of stuff, but when that stuff falls within a Markov blanket, it's capable of developing properties like consciousness. Markov blankets, in short, separate the internal states of a structure from the external states.[61] By Friston et al.'s interpretation, for instance, both cells and humans have Markov blankets that allow both separation from the surroundings and interaction with these surroundings (although only humans are conscious).

This Markovian perspective is often combined with enactivism, a view of cognition arising from the dynamic interaction between an organism and its environment (Kirchhoff et al., 2018). For example, take the concept of autopoeisis. A cell has to create boundaries to separate itself from molecular soup. It creates the very boundaries that allow for the process of creation. We too, as humans, create the very selves that allow for this process of creation.

To turn back to our subject of time, this same concept applies—of creating the conditions that allow for creation. Our actions, extended and structured in time, allow for the very creation of our sense of time. Time structures our thought and in turn is a product of it.

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[61] A somewhat more technical definition: the set of nodes such that for some given node X, the behavior of X could be fully predicted just by knowing the states of those other nodes (Clark, 2017). An even more technical definition for the mathematically inclined can be found in Pearl, 1988, pp. 97, 121.

18. Time is a quality

Let's land back on solid ground, if only for a moment, and refresh what we've covered throughout this thesis. We've seen that in the 20th century, phenomenology diverged from experimental psychology, but the two domains are again arcing towards each other.

We've seen that different phenomenological methods have different scopes. They investigate different temporal scales and have different ways of uncovering lived experience. This yields different results. We saw with our empirical comparison that DES uncovered more aspects relating to the visual space of mental images. For example, recall Julija's dual vantage point images, where she was both in the image and looking at it as if on a screen. Micro-phenomenology uncovered more aspects relating to the broader experience of the task. For example, take Ana playing with prompts, seeing how far she could stretch the description—imagining, say, a boy holding three ice cream scoop tools instead of three scoops of ice-cream. These findings rebuff the critique that micro-phenomenology gets at the 'how' of experience and DES only gets at the 'what' (Petitmengin, 2006).

Next, we introduced dDES. We saw that there could be a variety of temporal relations on the scale of two moments—Emerging, Disappearing, Overlapping, Transformation, Switch, Interruption, Cross-fade, Focusing/unfocusing, Grace note, Buffer, Intra-moment change, Rapid fluctuating awareness. Other codes might exist like Merging or Splitting, but these should be substantiated with more samples.

Experiential moments can vary in length. Some can be quite long, in the range of 5-10 seconds. Others can be very short and seem to last milliseconds. Sometimes divisions between moments are clear. They're marked by clear shifts in experience. And these shifts may, at times, even be tied to outside stimuli, like the music we listen to, as was the case with Adrien (Sample 4.5). At other times, separation is arbitrary, and experience doesn't divide neatly. dDES dividing experience into the two moments before the beep is a mnemonic tool—it may not actually reflect experience, but it can help participants be more precise in their reporting. They're encouraged to say when this division into moments is arbitrary to them.

We noted that there is some research indicating that we integrate information to divide consciousness into experiential moments lasting around 2-3 seconds (Pöppel, 1997; Wittmann, 2015). Even if this is true on average, dDES complicates this. Experiential moments can be much shorter than 2-3 seconds, or experience may not neatly subdivide. Elements don't always shift at the same time, and different modalities can shift piecemeal. Furthermore, temporal experience can be quite different for each person.

Indeed, temporal consciousness is idiographic. Even though we were able to code for certain patterns of experience, we must acknowledge that the heart of the method is in revealing people's unique experience.

For example, Adrien had certain shifts in experience that felt permanent and others that felt temporary. He called the temporary ones 'smooth jumps.' Even when he left one element of experience, it felt like he could return to it, and pick back up where he left off.

Max had frequent Overlapping experience. One element would last through both Moment 1 and Moment 2. Often this was a sensory element, for instance sensory awareness. The weird taste of tomato sauce against mouthwash. The painful feeling of plastic against a cut on his hand. Sensory awareness was a salient feature of Max's momentary awareness. This shows the communion between DES and dDES; between momentary experience and temporal experience. Clarifying sensory awareness as a salient momentary characteristic helped clarify Overlapping as a salient temporal characteristic.

Nora had frequent Switching. Experience in one moment would shift to a different experience in the next moment. This wasn't gradual. There was no fading in or out of experience.

We saw that Sophie and Nora had a dynamic that could be called Focusing/Unfocusing. An element could become more present in awareness, without necessarily 'increasing.' This most often involved feelings (although Sophie did have one instance with sensory awareness). A feeling could become more present in awareness without increasing.

This could have implications for understanding unconscious processing, along with Adrien's 'smooth jumps.' Perhaps certain mental elements can be processed without being in direct awareness or consciousness. DES and dDES can't directly probe the unconscious, but we can draw inferences based on how the conscious and unconscious meet, like a line in the water where a freshwater delta meets a saltwater ocean.

We saw that Matej had atypical momentary experience and atypical temporal experience. He had frequent highly localized aspects. For instance, inner speaking in a pancake region near the top of his head. These localizations could transform from one moment to the next. They could shrink, reverberate, or expand outward like light. They could vanish but leave a new feeling in their wake. This raised the potential for new codes of experience, but perhaps these are idiographic, and useful only for Matej.

Ali had experience that could shift rapidly. It didn't make sense for him to call each of these shifts its own moment. Instead, multiple shifts could be encapsulated in a single moment. We coded this as Rapidly fluctuating awareness. This kind of experience was most likely due to Ali's hypomanic phase. This shows that dDES is a potentially useful tool for psychopathology. Perhaps other conditions result in abnormal temporal experience.

We then turned to examining the phenomenology of the Libet task. This task shows neural activity before participants make the decision to move their finger. This experiment has been used to argue against free will. There is neural activity preceding our free decisions. But we saw that there is mental activity relating to the finger movement *far before* the

decision to move. Ali had thoughts like "I want to press" far before he made the actual decision to move his finger. Participants may have mental activity leading up to a decision, but may not be retrospectively aware of it. We also saw that for all our participants, temporal experience during the Libet experiment was very different from their everyday life temporal experience. These findings cast doubt on interpretations of the Libet experiment arguing against free will. They also situate dDES in the context of neurophenomenology and in a 'nomological net' of first- and third-person observables.

We then looked at three models of temporal consciousness—cinematic, retentionalist, and extensionalist. Respectively, is experience composed of atomistic phases, or a scaffolding of memory, or moments extended throughout time? We saw that our findings cast doubts on all three of these models in their most simplistic forms. First off, much of the justification for certain models is built off 'armchair introspection'—researchers asking, say, 'when *I* hear a melody, what is *my* experience like?' This kind of introspection has led to certain theories like the *continuity thesis*—that our streams of consciousness are unbroken and do not contain gaps. We saw that this is not the case. Both dDES and DES reveal gaps in consciousness with no experience. We also saw that the experience of hearing a melody is not as simple as models presume. For example, Adrien heard a melody without yet hearing any of the sonic particularities. These would come later, after the beep. This is counter to the neat retentionalist scaffolding of 'primary memory'—ABC with first A, then B(A), then C(AB). In the end, I call to avoid fitting dDES data with any of these models, but to build new models out of the dDES codes for temporal dynamics, in conjunction with neuroscientific findings and other psychological experimentation.

Finally, we turned to the connection between the physical and the psychological, and made certain comparisons between DES/dDES and physics. With special relativity because experience is different depending on the observer's frame of reference. Inner speaking can seem at normal speed to a participant. But they acknowledge that to an observer it would be ultra-fast. And we made certain comparisons with quantum mechanics, regarding concepts like complementarity. In physics, certain properties can't be measured simultaneously. And in experience research, perhaps a similar complimentary exists with the trade-off between synchronic and diachronic richness—that is, richness of momentary descriptions vs richness of temporal descriptions. We then extended the comparison to elements like imageless seeing and wordless inner speaking. Any attempt at description involves seemingly contradictory terms. This chapter, however, was largely speculative. For phenomenological data collection, bracketing any connections between the mental world and physical world is preferable. Nonetheless, we hinted at the possible utility of epistemological stances drawn from physics, and their application to experience research.

Let's address some limitations of this thesis (more limitations can be found in Appendixes IIA and IIB). For one, sample sizes are small—8 for the main dDES portion, 4 for the methods comparison, and 3 for the Libet experiment. This isn't so out of line with other phenomenology experiments (e.g. Hurlburt et al., 1994, with a sample size of 3; Kang, 2013, with a sample size of 4). Still, larger sample sizes are desirable for certain purposes, like making inductive generalizations, and reaching statistical significance or data saturation. Our aims, accordingly, were relatively modest. For the micro-phenomenology vs. DES experiment, we didn't intend to make overarching claims on the validity of each method. We merely wanted to show the contours of each method, and which aspects of experience they reveal. For the the Libet experiment, we didn't set out to falsify the original study. We merely showed certain possibilities of oversights in Libet et al.'s (1983) original study. For the main dDES portion, I didn't generalize to assert the most common forms of temporal experience. I merely showed possibilities of what temporal experience is like for different individuals. For these purposes then, large sample sizes aren't needed. But they would be necessary for further extrapolation from our findings. All of the studies here could benefit from follow-ups. Our Libet experiment, especially, could be considered a pilot study for a future study that more closely replicates the methods of the original study, including using EMG to judge the time of finger movements, and EEG to see if our participants really do exhibit Readiness Potentials.

Other limitations regard the participants chosen for this research. For the main dDES portion, they were chosen through convenience sampling. All were in master's programs. This admittedly only offers a certain cross-section of experiential possibilities. We're only looking at experience for participants of a high level of education. While our participants were from a range of nations, most fall under WEIRD designation—Western, Educated, Industrialized, Rich, Democratic nations (Henrich et al., 2010). Ali was a possible exception, coming from Iraq. Although has absorbed aspects of WEIRD culture through social circle in Iraq and life in Vienna, so may not be an exception. Future studies should diversify the background of participants.

Matej, Ali, and Adrien also may have had motivation to comply. All three were involved in the Libet experiment from its inception as a class project. This may have created demand characteristics for these participants when reporting on experience. Adrien, Matej, and Ali helped with coding the task, with analyzing some phenomenological data, and with writing up the original report. Could this involvement have affected how these participants reported experience samples? Might they have thought (even subconsciously) 'hmm I better report something interesting so that we have interesting results'? It's a possibility. Although dDES and DES try rigorously to weed out any confabulation. Both meth-

ods try to tease apart any subjunctification, hesitation, and changes in story. All participants showed they were capable of expressing doubt for certain samples. All participants had samples they were unsure of. This heightens my confidence that when doubt *was present*, it was reported rather than obfuscated.

Another limitation is that dDES is a new method. It hasn't been tested across interviewers. Or across researchers analyzing and coding the data. A good next step would be to see if multiple researchers can look at the same interview transcript and code the temporal patterns in the same way. Hurlburt and Heavey (2002) have conducted a comparable study of interobserver reliability with DES.

dDES also might have the capability of distorting the very experience it seeks to uncover. It's possible that memory constraints make the reporting of experience too difficult. Participants may be unable to remember their experience for two moments before the beep. This is a very real possibility. But again, participants are encouraged to voice any uncertainty they have. For quite a few samples, memory demands were too great to fully apprehend experience. It's an advantage of the method that any doubts can be voiced. This makes us more confident of the samples that participants do report on.

dDES also could be vulnerable to backward masking effects (Bachmann & Alik, 1976; Breitmeyer & Ogmen, 2000). If two stimuli are presented in rapid succession, most subjects will be able to identify the later stimulus far more reliably than the first. So might participants be able to apprehend M2 far more reliably than M1? It's a possibility, but this effect is strongest at a narrower timescale than that of dDES. At timescales of 250ms and above, backward masking is no longer an issue. Presumably then, for dDES, this effect does not distort data in a meaningful way. However, we must keep these potential criticisms in mind when conducting experience research.

Experience research must be done carefully. This kind of research is important. The level of consciousness we've looked at is central. The scale of the specious present is the scale at which we live our lives, in a string of continuously renewing nows. But this kind of research is still largely ignored in experimental psychology. It needs to be reintegrated. Researchers can't assume that they know what experience is like during tasks. They can't assume that task experience complies with experience in everyday life. Cognitive scientists can't assume that mentalisms like retrieval, computation, encoding etc. map neatly to any phenomenal experience.

And philosophers, on their side, need to base any theorizing on firm empirical grounds. The value philosophy is that it can build off existing research, venturing into abstraction, combining concepts, forming new theoretical frameworks, and speculating on new frontiers that can't yet be seen. But to be effective, philosophy must be based on the most up-to-date empirical research. It can build from there into greater abstraction, but the foundations must be solid. For consciousness research, the foundations aren't solid. I'm proposing

dDES as one tool in the effort to fortify them. But armchair introspection must be abandoned as a primary method of phenomenological research. This isn't a knock against philosophers—for decades there simply hasn't been much data to go off of. But good data must be sought out, and the rise of empirical phenomenology presents opportunities.

Implications

New areas of research can be opened up by integrating phenomenology and psychology. fMRI research on brain regions involved in time perception can benefit from knowing what experience is actually like during tasks. It would also be interesting to see if the different temporal codes we found (Overlapping, Switching, Interrupting etc.) correspond to particular neural activity. Perhaps, for example, Switching and Interrupting involve more sudden shifts in activated brain regions than Overlapping and Transformation.

The literature review back in the introduction would benefit from a phenomenological perspective. Researchers could investigate how temporal experience changes for children at various stages in their development (Piaget, 1927/1969). Or how it changes for older individuals (Wittmann & Lehnhoff, 2005).

Phenomenological methods could be used for all tasks that involve stimulus duration estimates and stimulus comparison, as well as research using questionnaires to infer temporal experience. These tasks may involve coordination of implicit and explicit time, and it would be useful to see how the two are enmeshed. This investigation could include tasks recruiting the oddball effect, where novel stimuli inflate perceived duration (Tse et al., 2004), tasks where interaction makes time pass faster (Conway, 2004), tasks where anxiety lengthens time estimates (Watts & Sharrock, 1984; Stetson et al., 2007), and tasks that induce 'flow' where sense of explicit time is diminished (Csikszentmihalyi 1990).

dDES should be used for a wide variety of people and groups. Its potential for psychopathology should be tested. We have preliminary results with bipolar disorder. But this should be expanded into a full study, with multiple participants. dDES should be used with other disorders hypothesized as related to time—ADHD, schizophrenia, depression, Parkinson's disease, and even dyslexia (respectively see Smith et al., 2002; Ueda et al., 2018; Thönes & Oberfeld, 2015; Pastor et al., 1992; Nicolson et al., 1995). We should also look into the possibilities of integrating dDES and DES into therapy. Can it inform how certain kinds of therapy, like Cognitive Behavioral Therapy, are directed? Many forms of therapy rely on breaking negative thought patterns. It would be helpful to know what exactly these patterns are for each patient, in order to target them.

dDES would also be useful to see what effects drugs like marijuana, alcohol, caffeine, or various psychedelics have on temporal consciousness. Psychedelic drugs are seeing a resurgence of interest for use in therapeutic treatment (for example, Fuentes et al., 2020). It would be beneficial to see how these drugs influence subjective experience.

Empirical phenomenology could be used to probe the experience of a wide variety of states. Regarding temporal experience, this could include meditative states. Or extreme conditions like isolation without normal circadian rhythms. Or potentially even lucid dreaming. We shouldn't limit our imaginations of what kinds of experience it's possible to explore.

dDES is especially useful for studying individual differences, and should therefore be integrated into the study of personality. This could include looking at controversial measures such as Type A and B personalities—with hypothesized differences in approaches to time (Friedman & Booth-Kewly, 1987). Other personality tests are candidates as well, such as the Meyer-Briggs Type Indicator and the Big Five (Meyers, 1962; John et al., 1991). Do any categories correspond to the frequent phenomena of DES or to dDES patterns of temporal experience? Or perhaps there's simply no correlation.

You can also look at experience through a social lens. There could be differences in experience between cultural and ethnic groups. For example, we've discussed the Ainu people, who have no clear counting of days and also have clear differences in behavior for night and day (Ohnuki-Tierney, 1973). It would be interesting to see how this accounts for experiential differences. DES and dDES are well suited to this research because excessive generalizations need not be made. The ideographic nature of the methods shines here. For a future area of study, I'm hoping to look at the inner experience LGBT groups, especially transgender individuals with gender dysphoria.

DES research has already hinted at possible directions in sociology. For example, different professional activity could alter experience. We saw the case of Cobo the guitarist with multiple independent strands of experience (Hurlburt, 2011a). This may potentially be a cause or an effect (or both) of his craft. When playing guitar, different experiential strands could be independently attuned to different elements of musicality—for instance, paying attention to tone or the expressive line of a melody. There are other examples from DES research of the potential interaction of professional activity and experience. For example, a professional potter with frequent sensory awareness, e.g. looking at the quality of a brick, or the way coke foams into a glass (Hurlburt, 1990). Again, this experience could be a product and/or cause of his craft. Perhaps people with a certain type of experience seek out certain professions. But it's also a possibility that spending 40 to 60 hours a week on one activity fundamentally shapes experience and temporal experience. In any case, it's an interesting avenue for future research.

More broadly, DES and dDES research can also contribute to theoretical work. For example, concerning distinctions between attention, awareness, consciousness, and sub-consciousness. Or concerning Theory of Mind, whereby we build the ability to attribute mental states to others. Or the Language of Thought hypothesis, whereby our thought follows patterns akin to language. (Fodor, 2008). Or dual process models of thinking,

whereby our thought can be divided into two systems, for example one systematic and the other intuitive (Chaiken & Trope, 1999). Phenomenological findings could substantially revise these topics.

They could also add to discussions of enactivism, embodiment, and other 4E approaches (Varela et al., 1991/2017). We've seen that experience can be quite variable for different people. People can have vastly different degrees of experience coded as 'sensory awareness' or as 'doing.' Such idiosyncrasies must be incorporated into studies of the enactive or embodied nature of consciousness. Hurlburt criticizes embodied approaches for papering over the variability of experience with generalizations (Caracciolo & Hurlburt, sections 239-240). This isn't to say that embodied approaches and other 4E approaches should be cast aside. Just that they need to be updated with phenomenological findings.

Topics like the neural correlates of consciousness could also benefit from an understanding of what consciousness really is. Theories like Integrated Information Theory make certain phenomenological predictions (Tononi & Koch, 2015; Tononi et al., 2016). It would be interesting to see how they hold up. Global Workspace Theory (Baars, 2005), the Attention Schema theory (Graziano & Webb, 2015), and the Temporo-spatial theory of consciousness (Northoff & Huang, 2021) are also candidates. Whenever predictions are made about conscious experience, they need to be cross-checked with experiential data. This also applies to a range of neuroscientific theories including Predictive Processing and the Free Energy Principle (Hohwy, 2013).

Basically, the program that I'm proposing is to fully integrate DES, dDES, and other rigorous methods of empirical phenomenology into all corners of psychology, cognitive science, and philosophy of mind.

dDES results could also be compared with findings from non-Western philosophical traditions, which are seldom covered in academia. For instance, there are strong commonalities between Western and Eastern philosophy of time. For example, Nāgārjuna (150-250/2013) and McTaggart (1908) used strikingly similar arguments to arrive at strikingly similar conclusions regarding the unreality of time—with some 1700 years separating them. There could be common ground with Eastern philosophy concerning some of the themes presented here, for example of presence and absence. We saw in some samples that nothingness could be directly experienced. In Adrien's sample T1.2, it took up roughly 85% of experience. Eastern philosophical traditions like Buddhist ones (Nāgārjuna, 150-250/2013) or the Kyoto school in Japan (Nishitani 1991) have a range of ways of dealing with nothingness. Some may be fruitfully conjoined with experience research.

Eastern philosophy also emphasizes understanding through practice, instead of just theory. Practices, like various kinds of meditation, offer different ways of understanding time. Declarative facts aren't the only way to access the world's truths. There's also access through lived experience. Meditation in this way offers different ways of understanding time, or perhaps even experience without time (Ataria & Neria, 2013).

Broader patterns

So the study of consciousness and time can venture outside the confines of traditional academia. It can be integrated with non-Western philosophy. It can leave the realm of declarative facts. Through various practices, we can understand time in different ways. Through art too, we can understand the intersection of time and consciousness.

In cinema, the hauntological real and unreal time of Tarkovsky. The mesmerizing onwards beating of Christian Marclay's 24-hour The Clock (2010). The crushing, breathing presence of Chantal Akerman. In visual arts, the paintings of On Kawara, each one just an austere data, but in seen together, the entirety of a man's life. In music, the degenerating regenerating time drips of Arca. The cosmically personal time journeys of Sun Ra. In writing, the inner-world time and space shifts of Virginia Woolf. The memory excavations of Proust—experience in its infinite gradations.

In the late 19th and early to mid 20th century, there was actually a great deal of communion between writing and psychology (Johnson, 1994; Schneiderman, 2002). Modernist writers like Woolf directed their attention to capturing the 'stream of consciousness' at the same time that introspectionists did. There was certainly osmosis between the two domains, if not direct causal links. Could that kind of osmosis come back?

I actually got into this research through literary writing. I was describing the book I was writing to a friend. He told me it reminded him of a psychological method he'd heard about—DES. Reading up on DES, I was fascinated. It was the experimental perspective on everything I was doing from a literary perspective.

My book was called *Inscape*, and consisted of semi-randomized sampling of my inner experience, in as much detail as possible. For one year I tried to take random moments of my day, and write down what was in my experience for the 2-20 minutes prior. I tried to write it so that it would take as long to read as my mental activity lasted. I wanted it to read 'in real time.' So 20 minutes of mental activity would take 20 minutes to read. Here's one section, in the spirit of the book chosen at random using a random number generator (from page 666).

"Eulogies seem like the worst. You have to capture other people; put all your experiences with them into words. Sounds terrible. Wouldn't know what to do. Always imagining eulogizing mom and dad and not knowing what to say. Because you have to describe people's personalities and I don't know what they are. Don't know other people. Trying to prove that you know someone. I guess the book-reading-guy really did know Lucia Berlin well. If she said 'I love you' a lot, he must've been close. How do you know someone? What else could I put on this bread? Olive oil? Trader Joe's olive oil. Or my canola oil. That's a good one; bread with canola oil; doesn't quite have the same ring. Imagine a restaurant where they serve bread with canola oil, instead of olive oil. That's a good one; funny mind right there. Is it though? Not the most brilliant. I take the olive oil bottle. Is it Zach's? Probably not. Probably Adam's. Would Zach really shop at Trader Joe's? Too black for that. I pour olive oil on the bread. It spills onto the piece below. Soaking in. Maybe it'll go bad. Does olive oil really go bad? Thought no. Like ancient Egyptian bees and teeth in honey. No it'll probably be fine. Soaking into the bread. Something wet by my feet. Is that the oil? Somehow dribbled to the floor. Through shoes; sticky soles. Did I really spill it? Thought I spilled more on the bread than on the floor. No it's probably something else. Something through my shoes. Or maybe it was already there. Maybe

it's just water. Feels stickier. Could just be water. It really is hard to try to get with someone. You think it's going so well but then nope, they don't call back. Roberto, no; Emma, no. And actually kind of had a crush on her. Frustrating. I do want to see her."

It's not quite DES. It's not the one moment right before the beep. It's a broader swath of experience from the time before I started writing. And this is just one short excerpt. Sections could be 1-20 pages long. But this broader cross-section of time allows broader patterns to emerge. What patterns can we see here?

We see patterns of social anxiety. Not knowing people well enough to give a eulogy. Not knowing people. Then a jump to choosing what to eat. Then a mental joke from incongruity—imagining a fancy restaurant that serves bread with canola oil instead of olive oil. Then a counterargument that this wasn't as funny as I first thought. Then thoughts of my roommate being too black to shop at Trader Joe's. Stereotyping based on demographics. Then sensory awareness—of olive oil soaking into bread. An associative jump to teeth preserved in honey. With a mental image? It's possible, but it's hard to say. In my book, I didn't specifically demarcate between unsymbolized thinking and images. Although I did try to demarcate inner speech with quotation marks. To compare to DES results, I've found from being a DES participant myself that my Unsymbolized Thinking is very high (at 80% of my experience). After the teeth and honey thought, there's sensory awareness of the sticky soles of my shoes. I try to figure out what it is. Then a mental jump to thinking how hard it is to find a romantic/sexual partner. And anxiety about my love life not working out.

And grouping this inner experience into broader categories we find clumps of anxious thoughts (eulogies, hooking up), associative jumps (teeth in honey, restaurants serving bread and canola oil), and distractions of sensory awareness (stickiness on my shoes, oil on the bread).

There may even be patterns related to psychopathology, of conditions I've been diagnosed with. The anxious thoughts could be from social anxiety disorder. The thoughts about Zach being too black to shop at Trader Joe's may be related to a form of Primarily Obsessional OCD—where I have obsessive thoughts that I am racist, and that leads to racially tinged thoughts.

So in my book we see a lot of broad patterns that we don't see in DES. Is any method more direct? For one, my book isn't scientific data. As we've seen, using yourself as a subject is risky. Also, I didn't use randomized beeps to choose when to write. I tried to randomize these moments as much as possible, but this was imperfect. Also compared to DES, substantially more retrospection is involved.

Let's return to the discussion of broad vs direct experience from Chapter 4. According to Hurlburt, DES deals with direct experience. Broad experience is something entirely different, governed by biases and generalizations (Caracciolo & Hurlburt, 2016). The experience of voyaging through India could be called broad experience. Our actual voyage is

composed of a string of nows. But any time we reflect on it afterward, we are using generalizations, presuppositions, and heuristics based on availability, frequency, recency, and salience. When we describe the experience to a food lover friend we might mention the curry. When we describe it to a music lover friend we might mention a sitar concert. When we describe it to ourselves we might imagine something different each time, based on the demands of the situation.

And Hurlburt thinks that there is no method of getting greater fidelity out of broad experience. He writes "Broad experience always depends on what is taken for granted, what perspective is being considered, and that taking-for-granted and perspectival dependency can change (usually unnoticed) from one situation to another, leading to dramatically different […] broad experiences" (Caracciolo & Hurlburt, 2016, section 130).

My book may not have involved outsized generalizations about experience. I still tried to stick to specific episodes. But it's not pure psychological data like my DES/dDES sampling with others. It still might involve distortions and biases, especially since demands of memory were more taxing than with DES sampling. But this doesn't mean that the temporal scales of DES or dDES are the only ones worthy of investigation. Maybe in the future, we'll see DES as hopelessly warping experience. We'll be able to apprehend experience at an even finer temporal grain. We'll look at experience on the scale of milliseconds instead of seconds.

I don't think any scale is better suited for examining consciousness. Different patterns emerge on different scales. But I do think that even if DES isn't necessarily *better* tied to reality than broader methods, its reality is certainly *different*. The phenomena that you see at the DES time-scale, *you don't see* at others. People can be unaware of their unsymbolized thinking. Or they can be unaware of fragmented multiple experience. Or they can confuse anxiety for anger. Or they could think they're constantly innerly speaking to themselves when they're not. Participants in this thesis frequently were surprised by the contents of their introspective data. This scale of introspection is not one we're accustomed to.

And some types of experience only make sense at the explanatory level of DES. Think of Melanie picking flower petals out of the sink with repetitions of the phrase "nice long time'" echoing in her head (Hurlburt 2011b, p. 282). This experience loses something by being further atomized, for example, to just the word 'time.' Melanie didn't experience herself just innerly hearing 'time.' She experienced herself hearing 'nice long time.' By atomizing experience, we can lose some of its meaning.

Even DES atomizes broader temporal patterns. There is meaning in these broader patterns that is lost in DES's scope. Hence the second line of our haiku: *different scale, different results*. We must not lose sight of how radically different these results can be. Even with all the distortions of retrospection, there were things I got from *Inscape* that I didn't get from DES. To use a metaphor, you can get certain truths from sociology that you can't get from chemistry. But we need to understand that these levels of explanation are different. And

we need to know that they exist. Right now it's like most researchers don't even know that chemistry exists.

I propose an embrace of a form of pluralism. But not an arbitrary pluralism. When we set out to use any method, we must acknowledge its limits. We can acknowledge the potential of micro-phenomenology while remaining aware of the critical difference between provoked and invoked micro-phenomenology, and the risk of incorporating too much retrospection into first-person accounts. We can acknowledge the utility of phenomenological psychopathology while being aware that it must remain open to revision if new research contradicts previous findings. We can acknowledge the potential of DES, while still seeing 'the moment before the beep' as an often arbitrary (if useful) fiction. We can acknowledge the potential of dDES while admitting it rubs up against the same arbitrary bounds set by DES. We can acknowledge the potential of autobiographical methods like my book while acknowledging that content may be warped by biases. Any method can be valuable so long as we understand its contours—what is the object of study, how are we examining it, what assumptions are we making, what fictions are we creating? Broad strokes can be useful if we understand where fiction starts to seep in.

Let's take another method with broader strokes than DES. Sripada and Taxali (2020) investigated spontaneous streams of thought—our unconstrained mental activity. They wanted to see how we transition from one topic of thought to the next. In one experiment, they had participants talk their thoughts out loud. In another experiment, they had participants stay silent but mark on a sheet of paper when they transitioned to a new topic of thought. The researchers found that thought isn't associative. It doesn't consist of one topic switch after the next. Our streams of thought follow a 'clump and jump' pattern. We mentally expound on one topic, then jump to another and stay there for a bit before jumping to yet another. You could think of it like a mental foraging pattern. First, let me point out that we can see that same clump and jump pattern in my book, *Inscape*. Thinking about giving eulogies and knowing other people is a clump. Wondering what to put on my bread is a jump. Although we should still be careful about Sripada and Taxali's methods. They may distort experience, since both verbalizing and marking out shifts in stream of thought may change this very stream. Still the results are intriguing. And again, our haiku applies: *different scale, different results*. We don't find a clump and jump pattern with DES. We don't even find it with micro-phenomenology. Only with methods looking at broader swaths of experience—such as think-aloud methods, or autobiographical ones—do we see this pattern. We see a new vision for how consciousness changes over time.

Let's take another work that deals with even broader strokes—Barker and Wright's book *One Boy's Day* (1951). These two researchers spent the entire day of April 26, 1949, tracking a boy, Raymond Birch, recording his every word and movement. This is more a

book about behavior than experience. But from behavior, we can sometimes infer experience. In that sense, the book is a foundational work of environmental psychology. Take, for example, a scene at 12:45 where two girls run up to Raymond and his friend Gregory. They say they'd been talking about the boys they were going to marry. One girl lets slip that the other girl said she was going to marry Raymond. The authors write, "Raymond Birch, seeming slightly embarrassed, leaned back against the wall." (p. 207) Here we have a broader scale from DES, dDES, and from my book even (which looked at atomized segments of my life and not the entirety of a day). We see broader patterns of behavior such as boredom at school and bursts of energy at play. We even get some peeks at conscious experience (presumed embarrassment in this example). This book actually went on to inspire Hurlburt's own work, of sampling participants in their natural environment.

So there's not just one scope with which to look at consciousness and time. From the scope of DES, Sripada and Taxali's (2020) methods and *One Boy's Day* can look rather broad. From other perspectives, they're still ruthlessly specific. Only by combining the multiplicity of these perspectives can we see a full picture of experience—like a painting made of a combination of strokes broad and small. With the broad, you might get the contour of a jawline. With fine points you might get light reflected in a pupil, or a scrag of nose hair. Up close it's messy, flawed even, no one stroke reflecting any kind of reality. But take a step back and you can see a person.

Let's take another leap to an even broader pattern. Take the words from my book: "[I] Don't know other people." Here I have anxiety about the possibility of giving a eulogy since I can't know people well enough to describe them. You could look at this in the context of this thesis, which is all about trying to know other people. Perhaps this curiosity is a flip-side of anxiety. A curiosity of finding unconventional ways to know people and to know human experience. So by looking at an even broader scale, from the words I wrote 5 years ago, to the thesis I'm writing now, you can hypothesize broader patterns. Connecting these projects is a drive to know other people, to know myself as an entry into knowing others, and to share the contents of my own consciousness—to be known. This drive isn't always successful and each method of trying to know other people comes with limitations. Conversation and friendship run against the boundaries of manners and social conventions. Research creates an artificial way of knowing others that can be removed from life—dissecting the frog can kill it. Books can go unpublished. We each are the sole keepers of our inner experience and how much we share with others depends on our desires of how much to put out into the world. Or does it? Sometimes thoughts we want to keep private seep through—in our words, glances, and the way that we move.

Excuse this amateur self-directed psychoanalysis. But this is meant as an illustration of the broader patterns in our consciousness that lie beyond the realm of DES. One of the broader patterns in my own experience is a drive to feel connected to the world around.

And a pattern in my thinking is pondering the relation between myself and others and the world. Are these broad patterns less real because they don't hew to direct experience, because they necessarily involve retrospection and generalization?

Hurlburt is skeptical of excessively broad accounts. He writes of broad 'historical' self-understandings that they:

> "like most historical accounts, are at best oversimplifications and usually substantial distortions of actual history, focusing on some events to the exclusion of others, focusing on one interpretation to the exclusion of others. Many (perhaps most) people have their favourite personal-historical accounts, usually called narratives, which they invoke often to explain or justify events and behaviour. Such told historical accounts (narratives) are part truth, part good story, part self-protection, and part self-presentation." (2011b, p. 286)

So my broader account of my drives may very well be part good story, part self-protection, and part self-presentation. But should we abandon any wide-angle view of our lives for the close-up snapshots of DES? Sutton (2011) raises the question of whether 17 DES snapshots can really "trump an accumulated life" (p. 125). Hurlburt responds that he doesn't expect them to, but it's actually possible that they can (2011b). DES can give us a glimpse of direct experience that broader views simply don't offer.

But that doesn't mean we should abandon other ways of looking at 'accumulated life.' Perhaps we can never separate the story from the truth. But we can still ask ourselves why we choose the specific stories we do. What goals do these stories help us achieve? Do they bolster our self-confidence? Or do they create a negative and destructive self-image? There are numerous approaches in therapy that focus on the stories we tell ourselves and the images we construct of ourselves—guiding patients towards less negatively biased stories of themselves (Emunah, 1994; Payne, 2006). The aim isn't necessarily towards true stories, but towards stories that are useful and let people live fulfilling lives.

Let's conduct a little thought experiment now. Ask yourselves how you can conceive of your own life in broad strokes and narratives. Are there certain life passions that have threaded throughout your life? Are there times when basic ways you viewed and approached the world changed? Are there periods where playful wonder gave way to cynicism? Or vice versa? Are there times when you retreated into loneliness? Are there times when you formed connections and felt part of your surroundings and community? Have you overcome insurmountable obstacles for glory? Have you overcome small daily struggles for a bit of relief?

We can conceive of our conscious experience in broad patterns. This necessarily involves some fictionalizing, but isn't this the only way to get at certain truths?

Ricoeur (1988) proposes that the temporality of the narratives we use to construct ourselves is a third kind of temporality apart from subjective time and real physical time. He writes that "Narrated time is like a bridge set of the breach speculation constantly opens between phenomenological time and cosmological time" (p. 244). As Ghallagher and Zahavi (2008) summarize, "Human time is the time of our life stories. It is a narrated time, a

time structured and articulated by the symbolic mediations of narratives" (p. 86). Narrative time certainly interacts with phenomenological time. The construction of narratives resides at least partially in experience. And narratives, in turn, shape our conscious experience.

I want to recall some of the neuroscience work we dealt with at the very beginning of this thesis. Friston posited a hierarchy of temporal scales of the brain and mind, in order of smallest to largest: Peripheral reflexes, Transcortical reflexes, Percepts, Concepts, Narratives, Self-awareness (Friston et al., 2018). I quibbled that some of these categories may not be so neat, but the model remains of interest. We can order the workings of our brain and mind into processes that cover a range of temporal scales. And narratives lie near the upper end of the list (see also Bouizegarene et al., in press). Narratives are central for taking the kaleidoscopic welter of our experience and parsing it into distinct, cohesive events. They're a way of forming patterns on broader and broader scales

We've seen that Wolff et al. (2018) and Northoff and Huang (2017) also write about the fractal organization of our brains and minds. On a neurological level, shorter frequencies are nested within longer ones. On a psychological level, our sense of self and consciousness must be preserved across various timescales. Our consciousness is thus structured over time via fractal organization. The bulk of this thesis has dealt with one temporal scale. But in this conclusion, we've expanded our view, to see that other scales show us other patterns of experience. Perhaps our temporal experience is fractal in nature. DES, micro-phenomenology, diaristic writing, think aloud protocols, phenomenological psychopathology, environmental psychology—all are methods involving different scopes and temporal scales. And all offer a different view of human experience. Perhaps there is no ultimate view for examining consciousness. Patterns are nested within patterns, like pinwheels within pinwheels.

What exactly are these fractal patterns born of the collision of consciousness and time? Have we exhausted them in this thesis? Not in the slightest. To look at the full scope may require stretching our imaginations, mixing fact and fiction, going beyond DES, and piecing together fragments of a science that barely exists. There are so many moments in our lives when time takes on a different texture.

Suspended time after a symphony, between the last note and the applause, hanging like a dust mote.

Languid sunbaked time, on the terrace drinking with friends.

Waiting for a train, watching the estimated minutes drag from 8 to 7 real slow, then rush the next time you look to 3.

In the arms of a lover, and you're in time but time's not there, just a warm neck and warm hair.

Or in crisis, running from a man with a gun, and experience barely exists, just action and instinct.

Time in the clink of bottles in your shopping bag, weighing your arms down as you calculate if you can make the next green streetlight.

Or when you're last in line at the doctor's and time's stretched arid before you.

In a train passing rhythmically over railroad ties, in iambs, duh DUH duh DUH.

In a cigarette balancing in an ashtray as a gust of wind lights up an orange chunk.

In the rhythms of boats rocking up and down, creaking metal sounds meshing with the lapping waves, lit with the pointillism of spray.

Watching a fly walk on your arm, its legs moving so fast that motion disappears and they look like flashes of successive states—stroboscoped freeze frames.

Dream time, flying over trees, but then you get dragged down, sinking into the next world level.

Time in sex, as you move from tender to hard, and it's inseparable from sweaty skin and the push and pull of bodies.

Or in the arhythmic grinding beats of an old fan in summer heat.

Or the doppler shifted tritone of an ambulance, now high now low.

Or the heartbeat rhythm of raindrops—a skewed golden ratio

Or the beats of conversation in its spasmodic peaks.

Or the beats of high heels on pavement, counterpoint against blasts of bodega Reggaeton.

Or the beats of work cycles, get up, work, happy hour drinks, home, exercise, shower, Real Housewives episode, sleep and repeat, the daily grind, blending into the rhythm of the city grind, of construction jackhammers, of cars like ocean waves, cresting, pulling out, cresting again.

The time of vines curling over walls, of birds setting off to migrate, of bears leaving hibernation.

Time between cracks of a whip in a BDSM dungeon, tinged with burning anticipation.

Psychedelic time, with a corner chopped off, knotted, and then pulled out of body and time in a violent current of energy.

The blink of a taillight on wet pavement.

Time in the call and response of birdsong, the call and response of drunk teens on the street, the adrenaline stretched time of birth, or off a ski jump stretched at the height of the arc, purified in the apex.

Time when the summer's over and you're buying back-to-school supplies, and that's it, it went by like it was nothing, like a splash of water at the community pool.

Daily patterns of dropping kids off at school, picking them up after soccer practice, time like the worn-out spot on a couch.

Time when dad puts on a classic soul record and dances with mom, and it's the eye in the storm of their fighting, slowed to the vinyl crackle.

When your youngest kid goes off to college. That chapter of your life gone.

The periodic rhythms of friends growing up, getting married, giving birth, moving away.

Time when you have to take the garbage out every Thursday after a long workday, and as the wheels scrape against the pavement, you realize you're marking time, Thursday then the next Thursday then the next, blending together, wondering what your life's added up to until now.

Time in the flows of politicians getting elected, starting wars, ending wars, continuing wars that were supposed to over, getting replaced by other politicians doing the same.

The rhythms of stock market booms and busts, ecosystem growing, getting destroyed, growing again, cities getting built, getting destroyed.

Time of empires rising and falling.

Periods of happiness, depression, recovery.

Rhythms of your head on a lover's belly as it rises and lowers. Of a glass of water as a train passes outside, ripples catching sunlight. Of sun piercing through tree branches from a moving train.

Sitting completely still on a couch but feeling like you're moving forwards, not in space but in time, like it's the wake from the end of a motorboat.

Some fictional flights can show the contours of how much we know about consciousness. Which is… very little. Only with a little speculation can we begin to understand what we're dealing with. dDES is just a small piece of a much larger puzzle. But experimental psychology, cognitive science, and so many other fields are ignoring that puzzle. To fully confront questions of consciousness we must use all the resources available to us. We must discover new methods and refine existing ones. We must push for institutional support. We must continue existing work into psychopathology and, beyond that, into a science of an individual. I dream of a new Copernican revolution, but an inverted one (let's call it the Nacinrepoc revolution). Whereas Copernicus shifted the center of the universe from *us* to the Sun, I propose shifting it back to *us*, our ego, our consciousness. We think we know all there is to know on the subject—aren't we egocentric after all, following our whims at every moment of the day? But it's precisely this centrality that makes us take the subject for granted, like a fish asking what water is (Wallace, 2009). For now, dDES has revealed the complexities and nuances of consciousness and its relation to time.

Consciousness can come with words, images, feelings, sensations, or any mix of these. Or clear thoughts with none of these.

Consciousness can be a world of illusions—sentences without words, images without vision, like mirages in the desert. Or as we saw, not too far from the foamy netherworld of quantum mechanics.

Moments can be slow, unchanging over many seconds. Or experience can be rapid, rushing from one thing to the next at breakneck speed.

Experience can be simple or complex; a minimalist loft or a house cluttered with knick-knacks.

Experience can seem as if it could be returned to, reversed, relived. Or can be full of breaks that feel permanent.

Experience can flow smoothly from one moment to the next. Or there can be gaps as it shorts and fuzzes.

Grace notes can flit between longer moments.

One element can morph into another, like a shifting globular mass.

Elements can become more present without increasing, like a childhood friendship that stays just as close no matter how often or seldom you call each other.

An element can fade out while another fades in, like late lilies blooming while irises fade.

What might seem metaphorical can be literal. Counterarguments can be mazes. Anger can be red.

Sensations can fill experience—the taste of tomato, the glint of light off the floor, the decay of a sustained guitar note.

Words can come in sentences or fragments, spoken or heard, in our voice or other voices, with or without sound.

Words can occupy shifting shapes in the head; globes, plates, bars, or pancakes.

Our thoughts can be structured by the rhythms around us, even by the music we listen to.

Feelings can be strongly felt in the body, burning, itching, leaving holes. Or they can be simply there, with nothing in the body

A sentence can be frozen, like a bug in amber, transmitted over time, but fully present at every instant.

Nothingness can take up a chunk of experience, like an air pocket trapped under a frozen lake.

Waking life can be as strange as our dreams.

These are new findings from a field that is often ignored in both psychological and philosophical research. Journeying into the intricacies of consciousness feels like a trip to a virgin jungle, where new species of plants and animals pop out at you. Here the unidentified species are new textures of conscious experience.

Consciousness research is often shunned. But for psychology and phenomenology to progress, this work must be done. Experience, consciousness, awareness, whatever you want to call it, this thing is too important to be ignored. It's perhaps *because* of this importance that it often *is* ignored. Heidegger wrote that being, as the "most universal concept," has all but been forgotten (1927/1985, p. 23). Human experience is one subset of being and a recursive interpretation of it—and in its ubiquity also risks being forgotten.

Our minds are the universe's way of perceiving itself, or maybe, since this attempt always falls sort, the universe's ways of telling fictions about itself. So our consciousness—with all its warps, eddies, interweaving strands, prismatic trails, syncopations, and stutters—is the universe's ouroboros-like attempt to grasp its own tail. Time, in turn, is how this experience is necessarily arranged, and in the ways that we conceive of it, it is the product of our experience. Time is both the beat to our consciousness and the sound emanating from it. Let's not close our ears to this music.

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Graphics

Active Hand by Claudio Guglieri from the Noun Project

Appendix I – Additional Participants

A. Clara

Clara is 27 years old and has recently received her master's degree in art history. She's from the United States and is living in Vienna. She was willing to learn the DES method and to be skeptical of her own experience. Still, it was quite difficult to ascertain the 'moment of the beep,' even on the third day of sampling. This made the switch to dDES more difficult. Even standard DES was difficult on the third day, and we switched to dDES on day four. We continued with two days of dDES. Some samples were not so clear. Others were clearer. No dominant temporal categories emerged.

As far as momentary experience, Clara had a predominance of unsymbolized thinking, for 31% of samples. This is above Heavey and Hurlburt's (2008) average of 22%. Clara's feelings were around average (including thought/feelings). Her rate of images and inner speaking was below average, with no samples of inner speaking and one instance of partially worded thought.

She also had a high proportion of 'doing.' This includes mental states best categorized as 'cognitive doing' like scanning a document. The category 'doing' occupied 31% of Clara's experience. Heavey and Hurlburt (2008) found a rate of under 3%. This discrepancy is potentially an artifact of Clara misreporting ongoing activity as being part of experience. However, it's potentially a salient characteristic of Clara's experience. She was often engaged and partially focused on tasks—writing a report, looking for a missing sock etc.

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In terms of temporal categories, Clara had a range of dynamics: Switching, Transforming, Overlapping, Emerging, Disappearing. There was one instance of a Buffer (a gap with no experience) although this was uncertain. We didn't establish any major broader patterns.

Her Sample 5.3 is a good example of how boundaries between codes may be blurry. Is it Transforming? Is it Overlapping / altering? This is an interesting sample because it shows one aspect changing while still very much being part of the same process.

Sample 5.3

Moment 1:

Clara is experiencing sensory aspects of opening an envelope—the feel of the paper, seeing it rip, and hearing it. It's uncertain if all of these aspects are really present, but the feel of the paper definitely is.

Clara also has the thought: is this a bill? This thought is unsymbolized. Coding: Sensory awareness, unsymbolized thinking

Moment 2:
Clara has the thought: does it look like a bill? This is non-verbal.
She's experiencing unfolding the contents of the envelope with care (so as not to tear them). <u>Coding</u>: Unsymbolized thinking, doing

Temporal:
The "is this a bill" thought transformed into the "does it look like a bill" wondering aspect. There was continuity between the two thoughts.
The M1 sensory awareness and the M2 doing were different aspects. Exact transition between the two was uncertain. <u>Coding</u>: Transformation(?), Disappearing, Emerging

In both moments, we have unsymbolized thinking about the contents of the envelope. In M1: is this a bill? In M2: does it look like a bill? Is this one continuous element? In which case, it would be categorized as Overlapping. Or is it two different but related elements? In which case, it would count as Transforming. But again, codes are only heuristic tools for understanding the reality of experience. What's more important than confirming a code is understanding the experience behind it.

B. Faith

Faith is a 30-year-old cognitive science student. She's from the United States and is living in Vienna. Music and her Christian religion are important to her and numerous DES samples dealt with these subjects. Faith was willing to adapt to the DES method. It was, however, difficult at times. Narrowing down the moment of the beep could be a challenge. dDES, with two moments before the beep, was especially difficult. For this reason, no predominant characteristics emerged for Faith's temporal experience. We conducted 3 days of standard DES and 3 days of dDES.

We can compare Faith's inner experience to averages from Heavey and Hurlburt (2008). Faith had a somewhat below-average amount of feelings and images. She had a far below-average amount of sensory awareness and inner speaking, with these categories occupying 0% of her experience. She also had a very high amount of unsymbolized thinking, occupying 71% of her samples. We can compare this to an average of 22% from Heavey and Hurlburt (2008).

Unsymbolized thinking was by far the predominant aspect of her experience. Faith even had different types of unsymbolized thinking. Some she described as relating more to the body, and others more to the head. But these locations weren't exactly physical. They were just ways of describing what Faith perceived as different types of experience. An example of a standard unsymbolized thinking sample.

Sample 3.5

Faith is listening to a video, about the lineage of Jesus. It's about how Mary came through Nathan, son of David and Bathsheba. Faith is thinking: oh is that the same Nathan I read about before, a few days ago? This is without words or images. <u>Coding</u>: Unsymbolized thinking

Samples like this, Faith described as being in her head. However, this was metaphorical and not literal. Here's an example of unsymbolized thinking that was less tied to her head and more tied to her body.

Day 3 Sample 4

Faith is wondering what made her cry before and what's going on with her feelings. This thought is a bit "lower" and closer to her "heart" than other thoughts. It is, however, a thought and not a feeling, according to her.

Faith also has a peaceful, chill, good, feeling. This doesn't have a bodily location. <u>Coding</u>: Unsymbolized thinking, feeling

Note that Faith has a feeling at this moment—the peaceful, good feeling. But she also has a separate thought: about what made her cry before. It's interesting that Faith rejected the term "thought/feeling" for this element. It was a thought, even though it was closer to her "heart." This location, though, was more metaphorical than literal.

Also of note is Faith's experience with religious content. Inner experience relating to religion was common e.g. thinking God was being patient with her. This occupied 26% of her samples. Salient findings regarding content are rare for DES. Most findings are about the process of thinking rather than the content. So it's noteworthy that so much of the content of Faith's thought related to religion. We should proffer the caveat that this could reflect the times when she chose to sample—for example, when she was relaxing, playing music, watching videos, rather than when she was studying. Still, it's safe to say that thought regarding religion is a major part of Faith's inner experience.

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In terms of temporal consciousness, Faith had a mix of dynamics. None of these emerged as dominant. The code Overlapping was somewhat more common than others, at 3/9 transitions. Faith did have a new code not found for anyone else. This could be called a Cross-cut. An M1 element cuts out with no gradual fade out. An M2 element enters with no gradual fade in. There is overlap where both of these elements are present simultaneously. This is similar to a Cross-fade, where two elements overlap, however here these elements cut in and out suddenly instead of gradually.

Sample 6.3

<u>Moment 1</u>: Faith is watching video about the lineage of Jesus. She hears "cut off from the breast and the enemy stronghold." She's simultaneously trying to understand all this (and the relation of words like "breast" and "stronghold".) <u>Coding</u>: Cognitive doing, perceptual awareness

<u>Moment 2</u>: Faith is trying to think if what she heard applies metaphorically to other things she can relate to. Especially regarding an enemy stronghold and rescuing people from sin. This is without words or images. <u>Coding</u>: Unsymbolized thinking

<u>Temporal</u>

It seemed like the trying aspect from M1 cut off all at once. Also, it seemed like the unsymbolized thinking aspect from M2 entered all at once. But there was a bit of overlap. <u>Coding</u>: Cross-cut

C. Sophie

Sophie is a 25-year-old cognitive science student and film buff. She's from France and is living in Vienna. DES sampling was difficult for her. Many beeps she didn't report on. She had problems remembering her experience prior to the beep. But Sophie was still skilled at the method, in that she tried to be as precise as possible regarding the limits of her knowledge. When she wasn't sure if an element was in her experience, she made sure to voice this. This is optimal for DES—preferable to participants overconfidently reporting elements that may not have been there. So while both DES and dDES were difficult for Sophie, she skillfully navigated the contours of her knowledge.

Compared to Heavey and Hurlburt's (2008) findings, Sophie had a similar degree of feelings, images, and sensory awareness, and a below-average amount of unsymbolized thinking and inner speaking. She also had an above-average amount of cognitive doing, at 15% of her experience. This phenomenon is otherwise rare, and Heavey and Hurlburt place it below 3% of experience.

For Sophie, cognitive doing often involved a process of 'trying.' In Sample 3.2, she's trying to figure out the correct pronunciation of the phrase 'pas encore.' In Sample 3.3, she's trying to form knowledge of Trump. In Sample 2.4, she's trying to see if a song in Spotify matches what she's hearing in her head—a melody but with "meowing" instead of singing. Cognitive doing was a salient aspect of her experience, and Sophie was tied with Max for the highest prevalence of this coding out of all participants.

Sophie also had a high degree of mixed codes—for example thought/feelings and imaged thoughts. She also had three samples with what could be called 'impressions.' This was rare for other participants. Sophie was tied with Matej for having the highest proportion of elements that could be coded as impressions. For example, in Sample 2.3, she has a mental image of a cliff and an 'impression' of the void to go along with it. Impressions aren't articulated enough to count as 'thoughts.' They aren't emotional enough to count as 'feelings.' But they do convey information. In Sample 6.1, Sophie has the impression that a sentence looks unusual. In Sample 4.3 M1, Sophie has a mental image of a scene from the

movie *Hiroshima Mon Amour*—a close-up of bodies hugging each other, covered in ash. She also has the impression of a woman's voice. She isn't actually hearing it or hearing any words. There are some sonic qualities to it, without it being sonically present.

<div align="center">❊❊❊</div>

As far as temporal consciousness, Sophie had a wide array of dynamics. No overarching patterns emerged. Sophie had one or two examples of the codes: Buffer, Switching, Focusing, Interruption, Overlapping, and Cross-fade. The code Buffer is important because it goes against the continuity thesis that there are no gaps in our experience (Dainton, 2010). Let's look at Sophie's example:

> **Sample 4.1**
> <u>Moment 1</u>
> Sophie had clicked on a slide that she expected to be blank but had text on it. Seeing the slide is part of her experience at this moment.
> She is also feeling confusion. Reality is different than expected. This confusion doesn't have a bodily location.
> She's also sensing her eyes squinting. This is experienced as pressure from the cheeks to the eyes. <u>Coding</u>: Feeling, sensory awareness, perceptual awareness
>
> <u>Moment 2</u>
> Sophie clicks to go to the slide underneath. There may be some realization to the moment—realizing she has to go to the slide underneath—but it isn't enough to separate out from the action itself. <u>Coding</u>: Doing
>
> <u>Temporal</u>
> There was a blank moment between Moment 1 and Moment 2. When asked if it was the experience of blankness or rather it was no experience, Sophie was leaning towards no experience (but it was hard to say). <u>Coding</u>: Buffer

So did Sophie have the experience of absence or the absence of experience? It was difficult for her to say for certain. But she was leaning towards the absence of experience. Samples like these aren't enough to fully rebuff the continuity thesis. But they are enough to cast doubt. The absence of experience is a theoretical possibility.

Sophie had another interesting temporal feature—what's coded as Focusing/Unfocusing. Here something could increase in awareness without increasing in intensity. Sophie had two samples with this dynamic. We noted that Nora also had this kind of dynamic—with feelings. A feeling could become more present in experience, without it making sense to say it was 'increasing.' I hypothesized that sometimes feelings could be in awareness, and sometimes emotional processes could be ongoing without being directly conscious—what Hurlburt calls "feeling-fact-of-body" (Hurlburt & Schwitzgebel, 2017, p. 187). Let's look at one of Sophie's samples involving Focusing.

Sample 5.2

<u>Moment 1</u>

Sophie is reading a book. At this moment, she's innerly speaking "oh it's almost positive now." It's her voice, regular pitch, regular speed, and those exact words. <u>Coding</u>: Inner speaking

<u>Moment 2</u>

Sophie reads "les fleurs fleurissent." This is experienced without any auditory qualities.

Sophie has a positive, nice feeling. It's hard to describe further and doesn't have a bodily location.

Sophie also has an image. It's of a blue flower blooming out of snow. Sun is shining on the snow. She can't say anything else about the details of the visual space. It's between an image and the feeling of an image. <u>Coding</u>: Reading, feeling, image

<u>Temporal</u>

The inner speaking ended as soon as the sentence was over. Reading "les fleurs fleurissent came after that. Sophie wasn't sure about the time between these aspects. The positive feeling came very soon, either with reading or right after reading. The image came slightly after.

Sophie described the positive feeling as a dashed line that became solid and then thickened. So it may have been present at Moment 1 but not so much in awareness or not at all in awareness. To Sophie, the description of "increasing" didn't work.

The image seemed to come all at once, but Sophie couldn't say for sure. <u>Coding</u>: Switch(inner speaking to reading), Focusing (feeling), Emerging(image)

So the positive feeling became more present in experience without necessarily increasing. For coding, I used the term 'Focusing / unfocusing.' Sophie used the metaphor of a dotted line becoming solid and thickening. I see this as the same category of phenomena as Nora's examples of Focusing/Unfocusing.

Of note, however, is that unlike Nora, Sophie had one example of Focusing that didn't involve feelings. It wasn't an emotional experience. This was for Sample 6.2, a sensation of pain between her shoulder blades. This is best coded as sensory awareness rather than feeling. The pain became more present without increasing in intensity at first (although it did later increase during M2). So it could also be coded as 'Focusing.'

While this is not related to feelings, it is related to bodily sensation—perhaps hinting at connection between emotions and bodily sensations. Both can remain ongoing, constant phenomena, even when not directly experienced. Interestingly, Sophie's samples of Focusing didn't always involve a bodily component to her feelings. They were mental phenomena, ongoing, but outside of the spotlight of consciousness. In our discussion, we postulated a link between Focusing/Unfocusing as a code and what Hurlburt calls 'feeling-fact-of-body' (Hurlburt & Heavey, 2006, p. 222). We then mentioned the caveat that it might be better to introduce a new term 'feeling-fact-of-mind.' You could have an ongoing mental feeling without it always being conscious.

Many theories have postulated relations between emotions and bodily sensation—the somatic marker hypothesis, and James-Lange theory of emotions among them (Dunn

et al., 2006). It would be interesting if in the future, DES or dDES could weigh in on these theories. For the time being, Sophie's samples, in tandem with Nora's samples helped establish Focusing/Unfocusing as a useful code, potentially applicable to future participants, and not merely idiosyncratic.

Appendix II — Full experimental designs

A. A comparison - DES vs. micro-phenomenology

Participants

We recruited four participants, or co-researchers, to take part in our study. They were all students of cognitive science at the University of Ljubljana, fluent in English, female, and between 23 and 26 years old. Our participants had little to no experience with these methods. Three of our participants had no experience with either of these methods before this study. One of our participants had previously taken part in a study conducted by our colleagues, using micro-phenomenological interviews. For this reason, she was asked to start with the micro-phenomenology part of this study.

Participants were selected based on their interest in exploring their inner experience. They were offered course credits as incentive for their participation, and gave informed consent to the procedure before taking part in the experiment. We have referred to our participants using pseudonyms for the sake of anonymity.

Design

Our participants were divided into two groups, each consisting of two people. They were told that the study had two parts, both involving a task and interviews. One group was asked to start with the micro-phenomenological interviews, and then participate in the DES training and interviews. The other group started with the DES training and interviews, and then performed the micro-phenomenological interviews. The DES training and interviewing was conducted by Julian Bass-Krueger. The micro-phenomenological interviews were conducted by Elisa Gabrielle Wiedemann. There was no communication between the researchers concerning their respective results until after the analysis was complete.

Task and Stimuli

To elicit mental imagery, we recorded 34 prompts for participants to hear. These prompts were recorded by a native English speaker, trained in the performing arts. The stimuli consisted of two sentences containing visual descriptions. We asked our participants to listen to the prompt and then imagine what was being described for 10 seconds. The task differed slightly between the two parts of the study and will be outlined below. Seven stimuli were selected and used for the interviews in both parts of the study:

A child holds an ice cream cone with three scoops. The ice cream falls onto the hot pavement.
A candle flickers in a dark room. A person sits down in front of it.

Three children skate on a frozen pond. Birds chirp in the trees.
A cat sits outside a shop window. It stares at its reflection.
A storm cloud gathers over a city. A lightning bolt strikes.
A family gathers around the dinner table. The father starts serving food.
A girl sits on the bus. She takes out her headphones.

For the micro-phenomenology portion, two of these prompts were chosen. For the DES portion, beeps occurred after 5 of these prompts. These were interspersed within a total of 32 prompts. The two prompts used in the micro-phenomenology portion were not included in the DES portion. Altogether the 34 total stimuli were:

A child holds an ice cream cone with three scoops. The ice cream falls onto the hot pavement.
A train moves through the countryside, past mountains. The sun shines through clouds.
A large fish chases a smaller one. The small one escapes.
A businesswoman rides an elevator. She checks her watch.
A candle flickers in a dark room. A person sits down in front of it.
A construction crew knocks down a building with a wrecking ball. It collapses.
An old lady in a wheelchair watches TV. A cat jumps onto her lap.
A man cooks onions in a pan. They sizzle.
Children run around a playground. A girl stumbles and falls on the grass.
Three children skate on a frozen pond. Birds chirp in the trees.
A boat sails over water. It rocks back and forth with the waves.
A waiter in a café walks up to a lady. He takes her order.
A group of friends cook a meal together. One of them tells a joke.
A woman puts a glass on the edge of a table. She puts down her bag.
A cat sits outside a shop window. It stares at its reflection.
Two friends meet in a park. They sit on a bench and start talking.
A whale swims to the water's surface. Its head bobs out of the ocean to breathe.
A flower blooms in spring. A bee lands on it.
A kettle full of water boils. A person takes it off the stove to make some tea.
A family gathers around the dinner table. The father starts serving food.
A girl sits on the bus. She takes out her headphones.
A scuba diver swims through clear water. He looks at bright coral.
A baby sleeps. It wakes up and starts crying.
A man looks at jewelry in a shop. He picks up a pair of diamond earrings.
A group of dancers performs. They are completely in synch.
A singer walks on stage. She grabs the microphone.
A boy checks his phone. There are no new messages.
A mother deer and her baby wander through the woods. They eat leaves.
A novelist sits in a bar. She orders some whisky.
Two cars drive down an empty highway. One pulls to the side of the road.
A photographer holds a camera. He presses the shutter.
An old man watches TV. He picks up the newspaper.

A storm cloud gathers over a city. A lightning bolt strikes.
A marching band marches through a town. The trombonist bumps into the drummer.

Procedure

Participants were given the information consent form, asked for demographic infor-
mation (age and gender), and were instructed on the general procedure of the study. They
then began with either the micro-phenomenological interviews or the DES part of the
study. Once the first part was complete, they moved on to the second part of the study.
There were at least six days between the end of the first and the beginning of the second
part of the study.

<u>Micro-Phenomenological Interviews</u>

For the micro-phenomenology portion of the study, participants were first given an
overview of the procedure. They knew that the aim of this study was to compare two
methods of researching inner experience.

Once participants were informed about the procedure, they were aurally presented a
micro-phenomenology communication contract—telling them they would not be judged
for responses, that no statements would be associated to them outside of the context of the
interview, and that they were free to not answer any questions. After agreeing to this, they
were given a simple spelling task to give them an impression of the kind of interview that
would follow. This idea mirrors the suggestion made by Vermersch (1994) to carry out a
simple task (such as spelling a word) in order to demonstrate the shift of attention needed
to go from the content of the experience to the underlying process.

Participants were asked to close their eyes and spell the word 'octopus' silently, to
themselves. They were instructed to raise their hand once they had finished and were then
interviewed about their experience during the task. The interviews involved a short evoca-
tion of the experience and some non-leading but directive questions aimed at shifting the
interviewee's attention towards the 'how' rather than the 'what' of their experience.

All participants felt comfortable with this procedure and moved on to the mental im-
agery elicitation task. They were asked to close their eyes, listen to the prompt, and imag-
ine whatever was described. The recording was played to them using the interviewer's mo-
bile phone and headphones, with the same settings for the volume on the device each time.
The prompts were coordinated with the DES part of the study, so that all participants
were interviewed about each prompt once, and did not hear any of the prompts twice.

The interview began immediately after the task was completed, and was conducted fol-
lowing the guidelines of Petitmengin (2006) and as outlined in the micro-phenomenology
chapter of this thesis. The experience that was explored was defined to start with the mo-
ment participants first began to imagine what was described (this was either during the
prompt or after it was finished), and ended 10 seconds after the prompt. The interview

specifically focused on the process of image formation—both of the initial image participants saw, and any elements which were later added. The interviews lasted from 23 minutes to an hour, and were recorded using either audio or video recording devices, depending on availability and participants' consent.

Each interview was followed by two questions about the accuracy and completeness of the given descriptions, to mirror the procedure of Petitmengin and Bitbol (2013). Our participants were asked (a) whether they felt that the description they gave was accurate, in the sense that it corresponded to the experience, and (b) whether they felt that their description was complete. They were then asked how knew that their descriptions were accurate/inaccurate/partly accurate (based on the answer they gave to the first question), and complete/incomplete.

After this, they were asked to come back for session 2 (which repeated the same procedure of listening to the prompt and imagining what was described, being interviewed about their experience during this task, and being asked about the accuracy and completeness of their descriptions). Participants who started with DES were informally asked about their thoughts on both parts of the study after the final session.

Descriptive Experience Sampling

A) Training

The training was carried out in the participant's everyday life and environment. They carried a smartphone that delivered 6 random beeps throughout the day, through an earpiece. Intervals between beeps ranged from 5 minutes to 1 hour. After each beep, participants jotted down what their experience was right before the beep.

Within 24 hours of the beep collection, participants were given a 1-hour interview that dealt with the beeps they collected. The interview followed standard DES guidelines (as outlined in Chapter 3 of this thesis and Hurlburt & Heavey, 2006). Any samples not discussed within this hour were discarded. Participants were told that they could skip any samples that they did not feel like discussing, but they should skip an entire sample, rather than leave out one element of a sample. They were told that at any time they were free to indicate if they would rather not have a sample used in research.

This procedure was repeated for 3 days. Standard DES sampling involves 5 days in order to make generalizations about participants' experiential fields. Here 3 days sufficed in order to train participants for the task. This meant that no generalizations of salient characteristics were made for participants' everyday life.

B) Task

Here participants listened to voice recordings of 32 prompts. 10 seconds followed each prompt, during which participants were free to form mental images. 5 beeps occurred at semi-random intervals during these prompts. Only certain prompts were beeped. These

were the same *7* that were tested for the micro-phenomenology section (although arranged so that each participant never received the same prompt twice). Beeped prompts were interspersed at random intervals. The beep came at randomized times during the 10 seconds following each prompt.

An interview was given after each beep, concerning the participant's experience right before the beep. These interviews generally lasted around 10 minutes. Participants would then return to the remainder of the task. Interviews followed standard DES guidelines as presented in Chapter 3 of this thesis.

Note that the task was not exactly the same for micro-phenomenology and DES. Micro-phenomenology only really needs to examine one episode of experience, although here we used two to make broader comparisons. DES relies on examining single isolated moments and having a sample size large enough to make generalizations. To collect 5 samples, we then needed to disperse them throughout prompts. So the DES portion involves a number of prompts with beeps interspersed, while the micro-phenomenology portion involves just two prompts and two interviews. This may have led to differences in experience, and this poses a challenge to further studies that combine multiple phenomenological methods: how to find stimuli that work for both?

Limitations

The sample size for this study is small. Other DES and micro-phenomenology studies do rely on small sample sizes (Hurlburt et al., 1994, with n=3; Petitmengin et al., 2013, with n=6). Still, a larger sample size would allow for more inductive generalizations to be made. For this study, we limited the scope of our generalizations. We merely pointed out potential differences in methods, rather than arguing for any overarching differences in findings and validity

Another limitation is that the task for each method is still not exactly the same. The DES portion involves random beeps interspersed among multiple prompts, while the micro-phenomenology portion involves two prompts. Perhaps this could have been improved if the micro-phenomenology interviews followed after a semi-random number of prompts. Still, there is no way to make the tasks fully identical.

There were some differences in instructions. For the micro-phenomenology portion, participants were instructed to close their eyes. For the DES portion, they were given the choice of whether or not to close their eyes. For the case of one participant (Lara) this made a difference, and her results were not included in our main discussion.

B. A free will experiment

Participants

This study involves three participants, selected through convenience sampling. Matej is a 22-year-old left-handed male. Ali is a 31-year-old right-handed male. Adrien is a 24-year-old right-handed male. All are cognitive science master's students. All are fluent in English. Participants signed consent forms.

Also, all three had some role in the project during its origins as a class project (for instance coding the experiment clock). Adrien had a larger role, originating the idea for studying the inner experience of the Libet task, and co-authoring the Libet study chapter of this thesis.

Training

The method of dDES was used for five days of training. dDES first requires that standard DES training be completed. This means that each day our participants were given 6 random 700hz beeps throughout the day. These came at intervals of 5-60 minutes. They were delivered through earphones with a cell phone alarm system. Participants were instructed to jot down their experience of the last uninterrupted moment before the beep. A 1-hour expositional interview was given within 24 hours of the sampling, to clarify the experience. The interview followed the procedure outlined in Chapters 3 and 7.

The dDES procedure can only start once this standard DES procedure can be carried out fully. For Matej, the interviewer judged that after 2 days of standard DES, Matej was ready to shift to dDES. For Ali and Adrien, 3 days of DES were carried out before the transition to dDES.

For the dDES section, participants were instructed not just to observe one uninterrupted moment before the beep, but two moments, as well as how these moments relate. The number and spacing of the beeps remained the same. Expositional interviews were again given within 24 hours of the samples. These lasted around 1.5 hours. Beeps not discussed within the allotted time were discarded.

Over the course of the 5-day training period, Matej participated in 2 days of DES with 8 total samples and 3 days of dDES with 9 total samples. Over Ali's 5 days of training, he participated in 3 days of DES with 16 total samples and 2 days of dDES with 7 total samples. Adrien participated in 3 days of DES with 17 total samples and 2 days of dDES with 11 total samples.

Task

The task was coded in Python using an adapted version from Vinding et al. (2013). It consisted of 80 free button presses. Over the course of these presses, we acquired random samples of experience. Some of these randomly occurred throughout the task (hereafter

referred to as off-button moments). Some of these occurred on random button presses (hereafter referred to as on-button moments). A 1000hz beep prompted participants to introspect. For each sampled moment, our participants were instructed to jot down notes about two moments of experience occurring directly before the beep and the relation of these moments. Due to technical externalities, we didn't always collect the same number of samples for each participant. We acquired 3 off-button samples for Matej, 2 for Adrien, and 2 for Ali. We acquired 6 on-button-press samples for Matej, 6 for Adrien, and 3 for Ali

The task was followed by dDES expositional interviews for each sampled moment of experience. These lasted approximately 30 minutes per sample. More detail on the expositional interview can be found in Chapters 3 and 7.

The task, adapted from Vindig et al. (2013) (itself adapted from Libet et al. 1983) consisted of a presentation of the instructions: "Press as soon as you experience the intention to do so. Select where the dot was when you experienced the first intention to press." This was followed by a clock with a rotating blue dot at the speed of one rotation per 2.56 seconds. The participant was then free to press the 'Enter' key on the keyboard. The button press was followed by a randomized short time period of the blue dot rotating (from 600ms to 1000ms) in order to avoid interference with the reported time of the awareness of the intention to press. This time of the first urge to press is hereafter called W-time. The participant was then presented with a similar clock on which he could use left and right arrow keys to move a blue dot around the clock and locate W-time. Once this was accomplished, a new trial started.

On the sampled button-presses, the pressing of the 'Enter' key triggered a beep that instructed the participant to jot down notes about his two moments of experience preceding the beep. Additionally, random beeps also occurred during the first 20 minutes of the task in order to gather data for experience during the task (off-button samples).

The task, due to adaptation and re-adaptation together with technological constraints, is different to some extent from the original Libet et al. (1983) task. However, we believe that the essence of the task—clock monitoring and free finger flicking—is preserved in our task. It is nevertheless important to point out that our set-up differs from the original Libet task. This is especially important since we did not acquire EEG data to verify that Readiness Potentials were indeed recorded. Our task differs in some major points: task instructions, no EEG cap or recording, button presses instead of hand/finger movement, and W-time reporting done with the keyboard by navigating a marker around the clock.

Behavioral results

Our participants' W times were earlier than those reported in Libet et al.'s original study (e.g. 419 ms earlier than the button press for Matej and 572 ms earlier for Ali). This places their results much earlier than those reported in Libet et al.'s original (1983) study

which were around 200 ms before movement onset. This difference between Libet's results and ours might indicate that our set-up did not accurately mimic the original study.

A difference with Libet et al. could be due to the way we acquired the time of the button press. We used a button press which records the movement's outcome while Libet et al. used an EMG (electromyogram) to measure the movement onset. A study by Haggard and Eimer (1999) suggests the time difference to be around 30-50 ms between the EMG onset and the button press, while Dominik et al. (2018) suggests a delay of 150 ms between EMG onset and button press. Our W-time's difference with that of Libet et al. could thus be partly explained by our method of calculating the time of the action.

It is also possible that knowledge of the dDES task disrupts W-time. In Jo et al. (2014) when the participant is asked to modulate the effort put in the decision, his W-times shift to 400-450 ms before movement onset. It's also possible that training in first-person methods allowed participants to apprehend W-time at earlier times.

However, these explanations might not be the only ones. Discrepancies in W-time might stem from our overall set-up. We would need a larger sample size to draw meaningful conclusions concerning this.

Limitations

One limitation is that participants were involved in planning. Adrien, Ali, and Matej helped code the task and analyze some phenomenological data. This could have created demand characteristics, where participants had motivation to report noteworthy phenomenological data. However, we don't believe this to be the case. The motivation for confabulating experiential reports was not so high, since this experiment merely started as a project for a cognitive science class. All participants showed good faith in reporting their inner experience as accurately as possible, and outlining any doubts concerning their reporting.

Not every aspect of the Libet experiment was replicated. For example, we used a computer button press instead of EMG. We also didn't use EEG. This should be considered a pilot study for a future study using EEG. A future study should replicate other aspects of Libet et al.'s study, including identifying different types of readiness potentials.

In our study, there were also some issues with coding the task. For example, some of the beeps fell while participants were writing down experience of previous beeps. These beeps were ignored. But this means that the number of off-button beeps was not standardized. The randomized beeps during the task also were not matched to cover the actual time of the experiment (since this depends on the participant's answer time and cannot be predetermined). Instead, they were set-up to cover a period of 20 minutes, our pre-estimated time for task completion.

Another limitation was that Ali couldn't complete a second day of the task, due to complications in planning related to SARS-CoV-2.

Finally, dDES is a new method and in need of replication. This experiment opens the door to future studies using dDES and a future study using an EEG, EMG and other components of the Libet study.

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