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Art Experience Types:
Identifying and Applying Shared Patterns in Phenomenal Experiences of Visual Art

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1. Introduction.

For millennia, the arts have maintained an immense social, cultural, and economic presence, and importance, in our societies (Dissanayake, 2008, 2013; Hoffmann et al., 2018; Zaidel, 2013). We encounter works of art in nearly every facet of our lives—not only in museums and galleries (Chan & Yeoh, 2010; Pelowski et al., 2017a; Tinio et al., 2014), but also in our homes, on our phones and computers, throughout our cities and community spaces (Chana et al., 2023; Dehove et al., 2025; Ho & Szubielska, 2025; Knoll et al., 2024; Mikuni et al., 2024; Trupp et al., 2022). These encounters can vary greatly from brief and mundane (L. F. Smith et al., 2017), to deeply positive and restorative (Csikszentmihalyi, 1991; Funch, 1997; Yi & Wan Abdullah Thani, 2023), negative and reactionary (Chrisafis, 2011; Silvia, 2009), and transformative and life changing (Pelowski, 2015; Pizzolante et al., 2024; Sherman & Morrissey, 2017). Engagement with the arts can evoke a wide variety of emotions (Fingerhut & Prinz, 2020; Menninghaus et al., 2019; Silvia, 2005, 2012), sensations in our bodies (Fingerhut, 2018; Kühnapfel et al., 2023; Wolterstorff, 2003), behavioral reactions (Burke et al., 2018; Chrisafis, 2011; Pelowski et al., 2024; Sonke, 2021), and cognitive reflections (Barbieri et al., 2023; Baumberger, 2013; Christensen et al., 2025; Funch, 1997; Pelowski et al., 2017b). Artists and scholars across domains have touted the uniquely personal, multifaceted nature of art experiences, as well as the profound impact that engagement with the arts can have on us, both individually and collectively (Cotter et al., 2022; Mughal et al., 2022; Sonke et al., 2023; Thomson et al., 2018; Trupp et al., 2025a). The arts and this notion of art experience as this incredibly nuanced phenomenon are pervasive in our lives, and yet, we lack a comprehensive understanding of what *actually happens* when we engage with a work of art, much less the potentially unifying aspects of art experience and the impacts of these experiences.

A significant portion of extant research focuses on a limited number of elements, most often ratings of aesthetic judgements, while neglecting what our experiences with artworks *feel like* (Hagtvedt et al., 2008; Leder et al., 2004; Pelowski et al., 2017b; Specker et al., 2020). Few studies systematically explore emotional and felt responses to art (Christensen et al., 2025; Schindler et al., 2017; Stamkou et al., 2024; Zentner et al., 2008); these existing approaches tend to identify relevant emotional dimensions but are limited

in their ability to assess potential patterns across dimensions and to describe experience holistically. A majority of studies further take place in a laboratory environment rather than in museums, thus removing engagements from the spaces in which where they may, arguably, be experienced most fully (Darda et al., 2025; Jonauskaite et al., 2024; Pelowski et al., 2017a; Specker et al., 2017; Szubielska et al., 2021).

This thesis emerged in response to growing calls for systematic investigation of the complex phenomenal experiences we have with (visual) artworks (Pelowski et al., 2017b; Sherman & Morrissey, 2017) and implemented a novel theory- and data-driven approach to assessing and conceptualizing the seemingly ineffable facets art experience. I aimed to identify potentially shared patterns in how people describe their experiences of art and characterize specific types of art experience, based on in-depth phenomenal reports of individual visitors' one-on-one encounters with specific visual artworks in museums and other major arts institutions.

The work constituting this thesis was supported by and embedded in a European Union-funded Horizon2020 project (TRANSFORMATIONS-17-2019, Societal Challenges and the Arts; 870827—ARTIS, Art and Research on Transformations of Individuals of Society; https://cordis.europa.eu/project/id/870827). A central activity of this program was to establish a foundational, data- and theory-driven framework for conceptualizing the nature, variety, and scope of experiences with visual art, on which we could build further understandings of the role of various stimulus, individual, and contextual features, as well as consider the potentially transformative impacts that art experiences may have.

1.1. Considering Judgements, Features, and Impacts.

The study of aesthetics as we know it today arose from old philosophical traditions of the role, function, and human experience of the arts (Baumgarten, 1735, 1750; Fechner, 1876), while the contemporary psychological tradition of empirical aesthetics traces back to studies of complexity, valence, arousal, and interest (Berlyne, 1958, 1975). Early studies in visual aesthetics sought to understand the ways in which stimulus features affected aesthetic judgements and evaluations—e.g., how features such as complexity, symmetry, curvature, color & form, abstraction & representation affected ratings of liking, pleasure, interest, beauty, complexity (e.g., Forsythe et al., 2011; Nadal et al., 2010; Reber et al.,

2004; Sidhu et al., 2018; for recent reviews, see Christensen et al., 2022; Miller et al., 2024 [2.1]; Pelowski et al., 2017b). Investigations later expanded to include features beyond those of the stimulus (artwork) itself, still leaning on judgement ratings to study the effects of contextual features of an art-encounter—e.g., museum versus laboratory settings, authenticity and genuineness, social contexts, provided titles or labels (Anglada-Tort et al., 2018; Darda & Chatterjee, 2023; Gerger & Leder, 2015; Grüner et al., 2019; Pelowski, 2012; L. F. Smith et al., 2017; Specker, Fekete, et al., 2021a)—and individual viewer characteristics—e.g., personality, expertise, visit motivations and approach (Brida et al., 2016; Darda & Cross, 2022; Dehghani Tafti et al., 2025; Else et al., 2015; Feist & Brady, 2004; S. P. Joy, 2008; Mastandrea et al., 2019; Silvia et al., 2015; Silvia & Nusbaum, 2011; Swami & Furnham, 2014; Williams et al., 2023). Results regularly show significant effects of contextual and individual characteristics on aesthetic ratings, though often with smaller effect sizes and less conclusive evidence than may be anticipated (Dehghani Tafti et al., 2025; Specker, Fekete, et al., 2021a). Nonetheless, these studies established the variety and complexity of art experience, defining it as a phenomenon constructed by blended features of an artwork, an individual, and the setting in which these two meet.

In recent years, we have seen increasing study of the potential higher-level impacts of arts engagement, from wellbeing and mental health (Cuypers et al., 2012; Directorate-General for Research and Innovation [European Commission], 2023; Fan et al., 2024; Fancourt & Finn, 2019; Thomson et al., 2018; Trupp et al., 2025a) to societal transformation and attitude change (Baumberger, 2013; Pelowski, 2015; Pelowski et al., 2017b; Sherman & Morrissey, 2017). In these studies, emphasis tends to remain on aesthetic judgements as the primary measures of experience, and as potential mediators or moderators of target impacts, which are found to explain some observed impacts (Fan et al., 2024; Fancourt & Finn, 2019; Sonke et al., 2023; Tomlinson et al., 2023; Trupp et al., 2025a). Individual judgement variables (e.g., liking, meaningfulness) are, on their own however, seemingly insufficient to explain the effects and impacts of arts engagement that we intuit and personally experience. Statistical approaches to such questions have become more robust, with increasing use of structural equation and linear mixed modelling to examine the relationship between multiple judgement ratings and impact

measures; more complex models, however, while revealing new potential mechanisms, do not always return more explanatory results (Trupp et al., 2023).

Across studies of contextual features, individual characteristics, and wellbeing and other impacts, there is a sense that the observed effects on or moderation effects of aesthetic ratings do not match the lived experience of these elements, which suggests that investigations may be missing something in their assessment of art experience. One proposal is that such approaches are not accounting for subjective experience itself, for what experiences *feel like* under different circumstances (Bruns et al., 2023; Christensen et al., 2022; Fingerhut & Prinz, 2018; Pelowski et al., 2017b). In philosophy and the sciences alike, subjective experiences are often disregarded as too complex, abstract, or unscientific (for counterarguments, see Dewey, 1934; Panzarella, 1980; Sherman & Morrissey, 2017; Wassiliwizky & Menninghaus, 2021), or simply a non-functional epiphenomenon, but the phenomenal aspects of experience have also been argued to have intrinsic value and function (Cleeremans & Tallon-Baudry, 2022; Kauffman, 2015). From this view, a comprehensive assessment of the nature and variety of lived, phenomenal art experience may provide a new and influential perspective from which to study the features and impacts of arts engagement.

1.2. A Shift Towards Phenomenal and Felt Experience.

Towards the end of the 20th and into the start of the 21st century, empirical aesthetics took an increased interest in understanding experiences with art beyond ratings of liking and complexity, marked especially by an increased attention to emotions. Up until this point, the relevance and role of emotions in art and aesthetic experiences had been discussed in philosophy and curatorial practices, occasionally in theoretical approaches of psychology (Baumgarten, 1735, 1750; Csikszentmihalyi & Robinson, 1990; Cupchik, 1995; Fairchild, 1991; Shibles, 1995; P. F. Smith, 1976; Stamatopoulou, 2004), but emotions had not yet become a primary focus of empirical research frameworks or methods. When briefly touched on, emotions were most often approached in accordance with valence & arousal (Berlyne, 1958, 1975; Cupchik, 1995; Kuppens et al., 2013; Lang et al., 1993; Silvia, 2005) and were rarely put into conversation with other features of aesthetic experience or broader concepts of, possible ranges of, or specific, emotions.

The early 2000s also saw the emergence of psychological models of aesthetic experience, where scholars began to organize the features, processes, and outcomes of an individual's meeting with an artwork—not only considering them independently but putting them into conversation with one another (Leder et al., 2004; Leder & Nadal, 2014; Pelowski et al., 2017b; Pelowski & Akiba, 2011; Tinio, 2013; Vartanian & Chatterjee, 2021). In the discussion of outcomes in these models, 'aesthetic emotions'[1] tended to be raised as a second output category, alongside 'aesthetic judgements' (i.e., liking, pleasure, interest, etc.). These models show the beginning of systematic consideration of what an 'aesthetic experience' is, how it may be constructed by psychological constructs, and where emotions fit into that picture. As these models placed a spotlight on emotions as an important feature of aesthetic experience, theoretical work explored potential types or categories of emotions and their role and relevance in art and aesthetic experiences (Best, 2007; Marković, 2010; Silvia, 2009, 2010; Silvia & Brown, 2007; Smuts, 2009; Stamkou, 2022). Early empirical studies tended to focus on assessing general affective or valenced responses (Kuppens et al., 2013; Reber et al., 2004; Vessel et al., 2012) or on investigating specific emotions or states—e.g., pleasure, loneliness, awe, chills (Cupchik & Wroblewski-Raya, 1998; Pelowski, 2015; Pelowski et al., 2021; Silvia et al., 2015; Silvia & Nusbaum, 2011; Williams et al., 2023).

This acknowledgement of the relevance of emotions, their integration into theoretical models and frameworks, and early empirical investigations of specific emotional states represented a critical shift in empirical aesthetics that pushed research beyond the study of evaluations and judgements. There was still, however, little engagement in broad assessments that sought to investigate the range and scope of emotional experiences, much less systematic consideration of the potential similarities or

[1] The term 'aesthetic emotions' is rooted in a Kantian theory of aesthetics and refers to "full-blown discrete emotions that, for all their differences in affective nature, relevant appraisals, and other emotion components, always include an aesthetic evaluation/appreciation of the objects or events under consideration" (Menninghaus et al., 2019, p. 171). They are further proposed to have unique aesthetic functions, specifically through their association with aesthetic (dis)pleasure and contribution to (dis)liking of a stimulus, and are argued to comprise a category of emotions distinct from broader art-elicited emotions (Fingerhut & Prinz, 2020). It may later be worthwhile to consider 'aesthetic emotions' as they relate to art experience in the way it will be framed and investigated in this thesis. In the immediate term however, the present work is interested in the range of emotions which may be elicited by and experienced while encountering a work of visual art. As such, I will not further discuss 'aesthetic emotions' specifically and will simply refer to 'emotions' as they are experienced by viewers during an art experience.

variance within felt experience. The active integration of emotions into theoretical and empirical work seen over the last 25 years is indicative of a growing desire to capture 'experience' itself in a more holistic and global way. This raises methodological challenges and questions of what it means to measure aesthetic experience.

1.3. Measuring Aesthetic Experience.

In parallel to the increasing discussion of the role, function, and value of emotions in empirical aesthetics, the field saw the emergence of scales to 'measure aesthetic experience,' both generally and in response to a specific (art) object. These often integrated philosophical or theoretical perspectives, much like the early psychological models, and aimed to make sense of 'experience' as a whole: the Aesthetic Experience Scale (AES; Stamatopoulou, 2004), Survey for the Assessment Aesthetic Perception (SAAP; Rowold, 2008), two parallel scales assessing emotions and attributes (Hagtvedt et al., 2008), Unusual Aesthetic Experiences Scale (UAES; Silvia & Nusbaum, 2011), Art Reception Survey (ARS; Hager et al., 2012), Aesthetic Emotions Scale (AESTHEMOS; Schindler et al., 2017), Aesthetic Experience Questionnaire (AEQ; Wanzer et al., 2020).

The AES (Stamatopoulou, 2004) and, more recently, the AEQ (Wanzer et al., 2020) assess general tendencies in what constitutes an individual's aesthetic experiences[2]; AES items were rated on a scale from 1 = 'never happens to me' to 5 = 'it happens very often,' while the AEQ prompts "in general, when I view art…" The others mentioned above involve the direct response to given stimulus artworks, with a range of responses (perceptual, cognitive, emotional, etc.; Hager et al., 2012; Hagtvedt et al., 2008; Rowold, 2008; Silvia & Nusbaum, 2011). Both types of scales may provide different insights and have different intuitive applications to secondary questions: the AES and AEQ to assessing individual differences in aesthetic dispositions, and the others to immediate stimulus features or acute experiential impacts.

All of these early scales—whether general or stimulus specific—sought to describe the structure of aesthetic experience. They were developed and validated by similar

[2] An even more recent related measure is the Aesthetic Responsiveness Assessment (AReA; Schlotz et al., 2021), which examines one's tendencies towards and sensitivities to beauty and other aesthetic qualities and behaviours. In contrast to those in the main text, AReA is designed as a trait measure of responsiveness to art, rather than an assessment of the structure of an aesthetic experience.

methods, beginning with the collation of emotional items to be rated, based on previous theoretical and empirical work. Data were analyzed via factor or principal components analysis with the aim of revealing underlying structures of aesthetic experience, thus organizing the presented behavioral measure. Specific factors vary between scales, but generally distinguish between cognitive, emotional, and evaluative/perceptual factors; the SAAP (Rowold, 2008) and ARS (Hager et al., 2012) also include factors related to self-congruence or self-reference.

Within these early measures, the inclusion of emotions in assessments of (visual) aesthetic experiences was limited[3]. Only one scale from Hagtvedt et al. (2008) and the UAES (Silvia & Nusbaum, 2011) were specific to assessing emotional experiences, though their approaches did not comprehensively explore the potential emotional space, or variety and range of felt experience. In their emotions scale, Hagtvedt et al. (2008) included a range of states, but analysis reflected a limited conceptualization of emotional variance, with four factors identified with each paring of positive or negative valence and high or low arousal. The UAES presents a scale of emotions specific to "profound, awe-like experiences," including three factors related to chills, touched, and absorption.

The AESTHEMOS represents a more contemporary and broader factor approach to aesthetic emotions (Schindler et al., 2017). Authors conducted an investigation of art-elicited emotions with variety of stimulus events (e.g., music concerts, museum visits, theatre performances, readings, film screenings) and a wide collection of emotion terms, based on extensive literature review. They applied exploratory and confirmatory factor analyses to structure and reduce the measure, ultimately to 42 items organized into 21 subscales and seven supraordinate factors. The AESTHEMOS was the first measure of aesthetic experience to discuss, in a detailed and data-driven way, different categories of emotions which were broadly relevant to a range of aesthetic experiences (e.g., pleasing, negative, prototypical, epistemic). At the same time, the functionality of the final measure and factor structure—with 21 subscale scores or seven supraordinate factors—is unclear, revealing a key drawback to factor or principal component approaches: the limited ability

[3] Earlier than with visual art, there were more comprehensive approaches to assessing emotional experiences with music. These typically used similar factor-based approaches in the construction of domain-specific music emotions scales (Scherer, 2004; Scherer & Zentner, 2001; Zentner et al., 2008).

to clearly assess the relationship and interaction between key emotional factors or patterns within experiential reports.

Some recent studies employ network modelling approaches to a similar end and identify communities of emotions or descriptors that cluster together, while allowing for visualization of the relationship between communities (Christensen et al., 2022; Kenett et al., 2023; Specker, Fried, et al., 2021; Stamkou et al., 2024). One such approach—derived from data collected on the semantic associations between terms commonly used to describe art experiences—identified 14 higher-order communities that describe a variety of impacts an art experience may have (Christensen et al., 2022); a list of terms that name these communities has been utilized as a behavioral measure in further studies (Darda et al., 2025; Estrada Gonzalez et al., 2024, 2025). This and other network approaches, however, run into similar limitations as earlier factor-based methods when it comes to succinctly describing a multivariate experience and assessing potential underlying patterns in participant experiences.

The last few decades have seen an explosive interest and investment in studying the role of and experience of emotions in response to the arts (for other contemporary, non-psychometric approaches, see Brook, 2022; Hosoya et al., 2017; Mikalonytė et al., 2025; Schubert, 2024). Yet, no one has offered a clear concept of how to consider or assess experience as a whole: a gap indicative of limited theoretical foundations—which rarely go beyond defining categories of emotions, or distinguishing between felt and perceived emotions—and truncated methodologies—which stop at the identification of emotional factors, while providing no way to examine the relationship between these. In each all these measures and approaches, an individual's art experience can be described in seven to 20-plus independent scores, but one's lived experience is not just the sum of its parts; it is a product of the interaction and interconnection between these elements.

The need to establish a concise and descriptive concept of art experience does not stop at simply understanding experiences but extends to the potential applications of such a concept to understanding what engagement with the arts can *do*. Centuries worth of texts, histories, and stories describe the nuance, variety, and impact of the arts; built into many of these accounts is a recognition of these impacts as rooted in felt, lived, phenomenal experience (Baumberger, 2013; Baumgarten, 1750; Dewey, 1934; Freedberg,

2013; Funch, 1997; Panzarella, 1980; Pelowski et al., 2017b; Sherman & Morrissey, 2017; Wassiliwizky & Menninghaus, 2021). At the same time, subjective experience is regarded as too complex, with some scholars going so far as to claim that such nuanced and fleeting experiences with art cannot be 'measured' precisely due to this complexity (Shusterman, 2000, p. 56) as "the psychologist … has absolutely no access to the synthesis of an aesthetic response" (Vygotsky, 1974, p. 205). Even if we disregard, for a moment, the arguably misattributed methodological skepticism embedded in these statements, such perspectives ignore the value that such an empirically grounded framework of phenomenal experience would provide. In a present day where we are looking to effectively mobilize the arts and their impacts (Belfiore & Bennett, 2010; EU Science & Innovation, 2022; Fancourt & Finn, 2019; Gao et al., 2023; Hugh-Jones & Munford, 2025; Mughal et al., 2022; Thomson et al., 2018)—not to mention having to justify the value of the arts in general to retain audiences and maintain access to resources (Bartosik, 2025; Capacity Interactive, 2021; Jowett, 2024)—there is a pressing need for new approaches to considering emotional and phenomenal experiences with the arts holistically, rather than piecewise. Particularly when we are not interested in stopping at *describing* experience, but wish to understand how art *affect* us, our wellbeing, attitudes, and perspectives and to advocate for its application in addressing contemporary societal challenges (Caldwell-Jones, n.d.; Cuypers et al., 2012; Pelowski et al., 2024; Pelowski, Miller et al., 2025 [3.2]; Trupp et al., 2024; Trupp et al., 2022), it is critical that we—at least attempt to—develop a method for capturing this complexity.

In advocating for such an attempt, I return to Stamatopoulou's introduction of the AES (2004), as the earliest measure I found proposed to 'measure' aesthetic experiences. He describes the purpose of his study as to "access the dynamic relationship between the person and the aesthetic object and to describe the aesthetic experience on the basis of empirical data"; he highlights the need to "investigate the essential meaning-structure of those modes of existence that are embodied and, in the praxis of the real-world situations, indicated by the name aesthetic experience" by focusing on "the experiential realm of the experience characterized by intensity of perception, depth of feeling and a sense of profound significance," further emphasizing the phenomenological approach inherent to his, and now this dissertation's, aim (p. 674).

1.4. A Novel Approach to Art Experience.

As it stands, we are left without any comprehensive study or measure of the nature and range of phenomenal experiences with (visual) art. Open questions ask what actually *happens* when we encounter an artwork, how do these experiences *feel* and impact us, and is there potentially anything shared about the ways in which we experience art? This thesis seeks to address these questions by directly investigating the scope and variety of phenomenal experiences individuals may have with works of visual art in museums.

Throughout the projects presented in this dissertation, emotions and other phenomenal states serve as a point of access to each participant's art experience[4], as a reportable representation of their internal, subjective experience. The centering of phenomenal experience, as well as the forthcoming methodological approach, is grounded in the Vienna Integrated Model of (Top-Down and Bottom-Up processes in) Art Perception (Pelowski et al., 2017b). This model elaborates on the cognitive processing of art experiences and suggests ways in which these processes may lead individuals in different directions; these cognitive stages are further paired with phenomenal and emotional states that could indicate their progression. It further posits a discrete number of possible outcomes of an experience, suggested to be generalizable across individuals, artworks, and settings, and characterized—and arguably, identifiable—by specific (combinations of) phenomenal responses (see Miller et al., 2024 [2.1] for further discussion and review).

To investigate the possibility of shared, specific varieties of art experience, my colleagues and I set out to collect in-depth reports of individual experiences of a wide range of visual artworks in museum settings. Museums are unique social and experiential environments in which to engage with the arts, which have been studied as and argued to be spaces of learning, cultural communication, and emotional healing (Baumberger, 2013;

[4] Up until this point, I have used 'art experience' and 'aesthetic experience' somewhat interchangably, as is often the case in existing literature. The concept of 'aesthetic experience' is extensively described in theoretical literature, but it is difficult to define and apply the boundaries of this concept in the context of immediate lived experiences (Specker et al., 2024). With the increased attention to everyday/urban aesthetics (Chana et al., 2023; Dehove et al., 2025; Ho & Szubielska, 2025; Knoll et al., 2024; Mikuni et al., 2024) and more mundane experiences with artworks (L. F. Smith et al., 2017) it has become clear that not all 'aesthetic experience' occurs in response to artworks and maybe not all experiences with artworks are 'aesthetic.' Given this, I intentionally use 'art experience' from here on to most accurately describe the experience resulting from the meeting of an individual and an artwork.

Dierking & Falk, 1992; Hanquinet, 2013; Li, 2024; Sherman & Morrissey, 2017; Yi & Wan Abdullah Thani, 2023). Ecological validity was a priority throughout this work, as we aimed to capture genuine in-museum art experiences in as natural a way as we could, to best understand how these experiences occur undisturbed (Dierking & Falk, 1992; Pelowski et al., 2017a)[5]. As such, we utilized a protocol—based on developing best practices for museum studies (see Miller et al., 2024 [2.1], 2025 [2.2]; Pelowski et al., 2017a)—that aimed to isolate and assess the meeting of one museum visitor and one artwork, while balancing the needs for experimental control and ecological validity.

Importantly, when selecting states to be reported on, this work further leaned into the reconceptualization of 'emotional experience'—as it is referred to throughout most of the extant literature—to the broader concept of 'phenomenal experience.' Emotions make up a huge proportion of the phenomenal states that contribute to our subjective experience, but do not account for all felt states, or for all states commonly discussed in the context of aesthetics (e.g., chills, insight; Muth & Carbon, 2013; Schoeller, 2015; Silvia & Nusbaum, 2011). When considering the full breadth of lived experience, many cognitive and embodied states—specifically those that may not be 'emotions' but that *feel like* something—arise as critical factors that shape our experiences (e.g., feeling like being watched, a sense of active engagement, awareness of one's body in space, the need to cry; Brinck, 2018; Cotter et al., 2018; Joy & Sherry, 2003; Kühnapfel et al., 2023; Pelowski, 2015). Relatedly, our assessment of phenomenal experience focused on *felt*, rather than *perceived*, states; this allowed us to distinguish between 'the artwork is sad' and 'the artwork made me sad'[6]. Each item that participants reported on necessarily had (the potential for) visceral, phenomenal character and could be used to describe their own, personally lived experience.

Following the collection of art experience reports, we applyed methods from network science to combine and analyze the collective phenomenal space that these

[5] A number of previous methods have conducted studies on the semantic association between phenomenal terms or relied on hypothetical recollections of experience (Christensen et al., 2022; Kenett et al., 2023; Zentner et al., 2008).

[6] Some previous studies of art experience have—at least in theory—distinguished assessed terms as felt and perceived (often referred to as descriptors), though many states (e.g., sadness) may be applied in both categories. As such the line between the two is often blurry and ill-defined (Christensen et al., 2022; Schindler et al., 2017; Stamkou et al., 2024).

experiences cover (Christensen, 2018; Christensen & Golino, 2021; Golino & Christensen, 2025; Golino & Epskamp, 2017). This allowed us to examine how individual states are related to one another and identify communities, or groups of items which are highly interrelated and distinct from neighboring communities. While initially comparable to earlier factor approaches (Schindler et al., 2017; Zentner et al., 2008), network modelling (also employed by e.g., Christensen et al., 2022; Specker et al., 2021)—in addition to being a modern, statistically robust method—provides additional metrics for evaluating the role and influence of specific items on the full network (i.e., hybrid centrality; Abbasi & Hossain, 2013; Golino & Christensen, 2025). Guided by these metrics, we selected a set of 'core' phenomenal states that well summarized the overall network structure.

In an analytical step that extends beyond previous approaches to assessing art experience, we applyed a latent profile analysis across the list of 'core' items to investigate commonalities in the self-reported experiences (L. K. Muthén & Muthén, n.d.; Nylund-Gibson & Choi, 2018; Weller et al., 2020), based on the understanding that we, as humans, share a common perceptual and cognitive foundation (Baltissen & Ostermann, 1998; Jagodzinski, 1981; Pelowski et al., 2017b). Through this analysis, we identified groups of reports that reflect common patterns, or profiles, which reflected distinct varieties of experience. Individual participants were then assigned to the group whose profile best reflects their own report, essentially clustering participants together based on a shared reported experience.

With this approach, the immediate element of interest is one's subjective, felt experience, leaving stimulus features, individual differences, and contextual effects as secondary. These independent details of an encounter are anticipated to be relevant in shaping *which type* of experience a specific person has on a specific day with a specific artwork, but they—theoretically—would not change what the *possible types* of experience are. Consider for a moment a metaphor of a popular hiking trail that has designated paths and lookout points that offer different views of the surrounding landscape. Which specific path a particular person ends up taking on a given day does not change what the possible lookouts are, but many factors along the way will contribute to which path they choose or are driven to take, and so will affect which lookout they ultimately arrive at. And that is not to say that everyone who ends up at the same lookout had the exact same experience on

their way hike up, or that no one ever hikes off trail and finds their own lookout, but a vast majority of people will follow the given paths and end up at one of the common lookouts to see the same view as everyone else who finds themselves at that same lookout.

This Thesis.

The present work addresses the questions posed above: What *actually happens* when we engage with an artwork? What do these experiences *feel like*? Are there shared patterns to how art engagements are experienced and reported, and do these patterns reoccur across individuals and stimuli? (How) are these different kinds of experience related to broader assessments or impacts of the arts?

This thesis is structured in two chapters: the first is comprised of two museum studies which seek to identify—preliminarily in Miller et al. (2024 [2.1]), then more substantively in Miller et al. (2025 [2.2])—common patterns in reported phenomenal experiences and develop an understanding of the potentially shared types of art experience. The next chapter explores a range of ongoing extensions and applications of the established set of Experience Types to investigations of individual differences [3.1], wellbeing and societal challenges (Pelowski, Miller et al., 2025 [3.2]), art experience in the brain [3.3.1] and in digital contexts [3.3.2].

2. Identifying and Characterizing Shared Art Experience Types.

The primary empirical work of this dissertation is comprised of two museum studies which sought to capture and collage nuanced reports of visitors' experiences with works of (visual) art. They are grounded in a common theoretical and conceptual framework, which posits discrete outcomes of art experience that can be identified by the emotional and phenomenal states felt during said experience (Pelowski et al., 2017b).

In both studies, everyday museum visitors were convenience sampled and asked to view a specific (set of) artwork(s). After this viewing period, they completed a self-report questionnaire measure, indicating the degree to which they felt a number of phenomenal states—including emotions, affective, and cognitive items which have a visceral, felt quality to them—and providing ratings of common aesthetic judgements and impact measures (Pelowski, 2015; Pelowski et al., 2017a; Schindler et al., 2017). Responses were then combined in a network model that depicted the phenomenal space in which these experiences occur, describing the relationship between individual items and revealing and underlying community structures (Christensen, 2018; H. Golino & Christensen, 2025; H. F. Golino & Epskamp, 2017; Specker, Fried, et al., 2021). A reduced set of 'core' items were selected based on hybrid centrality—a metric which, for each item in the network, describes the position and influence of that item on the surrounding items and overall network (Christensen et al., 2019; Pelowski et al., 2021; Pozzi et al., 2013)—to effectively summarize the structure and variance of the full network. A subsequent latent profile analysis (LPA) was conducted to identify recurrent latent profiles, or common response patterns across the set of core items (L. K. Muthén & Muthén, n.d.; Pelowski et al., 2021; Weller et al., 2020). Finally, within the LPA, individual participant reports were matched or assigned to one of the identified profiles, defining groups of participants that reported comparable experiences. The identified profiles, or Experience Types (ExpTypes), were distinguished by their unique phenomenal characters, as well as their groupwise relation to various judgement and impact ratings.

An initial investigation is presented in the first paper, which articulates the theoretical underpinnings of this approach, reviews previous approaches to describing art experience, and offers preliminary empirical results that substantiate our analytical

approach (Miller et al., 2024 [2.1]). The second paper builds on the first with an expanded list of phenomenal states and broader collection of artworks and individuals, defining five Experience Types (Miller et al., 2025 [2.2]). Findings of these museum studies support the notion of the nuanced, but also shared, phenomenal aspects underlying experiences with (visual) art and establish a substantive framework from which future work can consider further research questions and applications.

2.1. What Can Happen When We Look at Art?

This first publication sets the theoretical and empirical foundation for the methods employed throughout this dissertation. The introduction discusses the challenge and necessity of capturing—potentially shared—art experiences at the level of how they *feel*, rather than only assessing their perceived valence or hedonic value. We review previous methods for assessing art experience and discuss the limitations of traditional factor-based approaches, specifically emphasizing their inability to consider patterns of relationships *between* identified factors, components, or communities in a systematic way.

The VIMAP (Pelowski et al., 2017b) is introduced as a theoretical model which posits specific, categorical outcomes of art experience which may be had, on the basis of one's cognitive and emotional progression through said experience. We further propose a novel methodology for analyzing participant reports—specifically via network modelling and latent profile analysis—and, potentially, uncovering shared patterns in those reports, which would correspond to distinct ways in which one may experience an artwork. From the model, a list of 45 affective and cognitive terms was compiled and employed in the empirical study as a self-report measure. Participants (N = 345) reported on their experience of one of three selected exhibition rooms of varying styles.

The network model identified five communities of affective/cognitive items, many of which aligns with previous studies that employ factor or principal component analyses (Christensen et al., 2022; Schindler et al., 2017), and guided the selection of 13 'core' items. The latent profile analysis across these items supported selection of a five-profile solution, identifying Harmonious, Facile, Transformative, and two Negative profiles. We discuss the implications of these findings in consideration of the guiding model (Pelowski

et al., 2017b) and the broader literature, as well as lay plans for conducting a more robust follow-up investigation.

This initial empirical study provided the necessary foundation for further work, through review of existing theoretical and empirical literature, as well as presentation of preliminary results which verified the efficacy of our proposed methodology.

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Contributions:

I joined the project team to spearhead the finishing of the manuscript and coordinate the submission. The study was conceptualized and developed by MP and JF, with support from KC and HL. Data collection and primary data analyses has been conducted by KC and MP prior to my joining. I conducted some secondary analyses and contributed primarily to drafting and revising the manuscript (Introduction and Discussion). All authors provided feedback, and I facilitated the submission of the paper.

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What *Can* Happen When We Look at Art?: An Exploratory Network Model and Latent Profile Analysis of Affective/Cognitive Aspects Underlying Shared, Supraordinate Responses to Museum Visual Art

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Abstract

Art-viewing is a defining component of society and culture, in part because the experience involves a wide-range and nuanced configuration of emotional and cognitive responses. Precisely because of this complexity, however, questions of the actual nature, scope, and variety of art experience remain largely unanswered: what kinds

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of patterns do we exhibit, how do various components go together, and can these be distilled into shared experiential outcomes? We introduce an exploratory study based on 345 individuals' unique experiences with one of three sets of artworks. Experiences were assessed via 46 affective and cognitive items based on a recent model, with individuals reporting to what degree they felt each during their encounter. Network and latent profile analyses revealed five patterns, aligning to a *Harmonious*, *Facile*, *Transformative*, and two *Negative* outcomes. These largely supported model hypotheses, connected to specific appraisals, and could be found, although with varying probability, across individual viewers and artworks.

Keywords
art experience, latent profile analysis, museum studies, network model

> "The psychologist may, at best, reach the stage of analysis; he has absolutely no access to the synthesis of an aesthetic response" (Lev Vygotsky, 1974, p. 205)

Every year, billions of individuals across the globe encounter works of art (Chan & Yeoh, 2010; Tinio et al., 2015)[1]. Art can be found across cultures as an integral aspect of society (Becker, 1982). It is seen as a defining element in human evolution (Dissanayake, 2008) and perhaps as a defining feature of the human species itself (Zaidel, 2013). Whether in museums, city centers, online, or at home, art is an omnipresent feature of modern existence.

Underlying this interest is a pervasive idea of a complex, multifaceted experience. For centuries, when individuals describe *in which ways* they find art important, *why* they go to museums, or when they describe their favorite artworks, they have done so by recounting a variety of affective, cognitive, and physiological aspects (Funch, 1997; Pelowski et al., 2017c). Art, we are told, can evoke myriad emotions (Fingerhut & Prinz, 2020; Menninghaus et al., 2019; Silvia, 2009) and lead to diverse appraisals, meanings, memories, and associations (Leder & Nadal, 2014). It can evoke different responses in our behaviors and bodies (Fingerhut, 2018; Kühnapfel et al., 2023; Wolterstorff, 2003). Art might transport us to moments of awe and wonder (Fingerhut & Prinz, 2018), harmony (Funch, 1997; Shusterman, 2006), insight (Christensen et al., 2023a; Lasher et al., 1983), or even transformation (Pelowski, 2015; Pelowski & Akiba, 2011; Sherman & Morrissey, 2017). Art, of course, can also be uncomfortable, confusing, can make us angry (Chrisafis, 2011; Silvia, 2009), or simply be derivative, boring, or inert (Smith et al., 2017). These reactions—positive or negative, quotidian or profound—can differ greatly between individuals, between settings, or even between two moments for one individual within one experience itself.

Unraveling this "power" of art (Freedberg, 2013) to evoke such a range and depth of responses stands as one of the most basic and important topics for art-related research. Belletristic accounts of art's multivariate nature are a central aspect of art historical, philosophical, and critical discourses (e.g., Elkins, 2005; Freedberg, 2013;

Panzarella, 1980; Shusterman, 2006). Anticipating, collecting, and comparing features is key for museum and curatorial studies (Dierking & Falk, 1992; Tröndle & Tschacher, 2012; Yalowitz & Bronnenkant, 2009), for art education (Parsons, 1987), and is especially key for psychology and empirical aesthetics.

The past two decades in particular have seen a multitude of investigations, with researchers producing insights regarding the large number of factors implied and evoked from art—including individual appraisals, aspects of meaning (Leder & Nadal, 2014; Palmer et al., 2013 for review), art-evoked emotions (Hagtvedt & Patrick, 2008; Fingerhut & Prinz, 2020; Menninghaus et al., 2019; Silvia, 2005; Specker et al., 2020), as well as how art influences the way we move our eyes and bodies (Kühnapfel et al., 2024; Rosenberg & Klein, 2015) or other physiological response (Gerger et al., 2017; Markey et al., 2019). Studies have also begun to trace some general progressions in art perception, such as from an initial impression to detailed focus (Locher et al., 2010), and identify interactions between elements, such as between some specific emotions and appraisals (Silvia, 2005). This has been coupled with emerging interest in more profound states (Csikszentmihalyi & Robinson, 1990; Fingerhut & Prinz, 2018; Schlotz et al., 2021; Silvia & Nusbaum, 2011; Vessel et al., 2012; Wanzer et al., 2020), insight and self-reflection (Pelowski, 2015; Vessel et al., 2013), and even exploration of some compelling blends in responses, such as appreciation of confusion (Muth & Carbon, 2013) or visual pleasure from negative art (Cupchik & Wroblewski-Raya, 1998; Ishizu & Zeki, 2017). These topics expand beyond the lab and gallery, offering connections from fundamental questions regarding perception or affect, to other domains such as religion and sports (Brown & Dissanayake, 2018; Funch, 1997), and raise compelling questions regarding the unique impact of art experience in addressing societal challenges (Pelowski et al., 2022) or wellbeing and health (Cuypers et al., 2012; Fancourt & Finn, 2019; Trupp et al., 2022, 2023).

At the same time, the current state of art research has yet to address an important set of questions at the base of our sustained engagement with art, namely those surrounding the multivariate, interconnected, and potentially shared or defining nature of such experiences. To date—although there have been many factors considered—research has tended to present a rather limited view of each art engagement, with each investigation targeting only a small subset of relevant elements. This is driven, primarily, by requirements for controlled, interpretable data, as well as by theoretical approaches, which tend to emphasize initial understanding, visual appraisal, basic positive or negative assessments, and/or hedonic response (Pelowski et al., 2017c). We are also limited by a lack of ecologically valid investigations of engagements with real works of art in the settings they are predominantly experienced (Pelowski et al., 2017a; Specker et al., 2023). This has left us without a systematic understanding of the complex interconnection and variety of elements relevant to art experience, limiting our conception of *what can happen* when we engage with art. To establish such an understanding is argued to be one of the most crucial topics in contemporary art scholarship (Cross & Ticini, 2012; Pelowski et al., 2017c; Tallis, 2008; Zentner et al., 2008).

Without a framework for anticipating, investigating, and identifying the scope and nature of art experience, we cannot begin to meaningfully compare artworks, individuals, settings, and/or other contextual factors.

Even more, this deficiency touches a general question at the center of all art-related discourse—are there broad patterns within the diverse ways we respond to art? Multiple authors and studies have implied some primary, shared features to the ways we respond to art, tied to the nature of our underlying biology, neuronal structures, and psychological aspects (e.g., Dewey, 1934; Funch, 1997; Pelowski et al., 2017c for review; see also Jagodzinski, 1981). Others have objected to this view precisely due to the nuance and scope of art engagements, asserting that each individual experience may be personally unique or esoteric (e.g., see Shusterman, 2000 for review). Identifying some shared features could advance conceptual and philosophical approaches to our interactions with art, as well as provide a key foundational element for future art or cultural applications and empirical work. Yet, with the present state of research, we are left without a basic way of addressing this question or considering what might be unique or shared across our encounters with art. "Given the formability of its rich yet fleeting immediacy," suggests one such argument (Shusterman, 2000, p. 56, see also the quote that began this paper), "how are we supposed to measure (let alone communicate) magnitudes of an experience which cannot even be properly defined or marked off for measurement?" Here we take an initial exploratory step in addressing this topic.

Multi-Participant and Multivariate Assessments: A Step Towards Unlocking Shared Art Experience?

Recently, a handful of studies have introduced new methods to move beyond single-stimulus or single-factor investigations to a more global, integrated assessment of art experience. These follow a common set of procedures, involving, broadly: (a) the compilation of several target factors, typically in the form of lists of emotions and other phenomenal states, that have been connected to interactions with art and/or aesthetic experiences; (b) the use of such a list as a self-report measure as a basis for data collection across a number of individuals and art engagements; (c) the combination and consolidation of data across cases and individual viewers via various statistical procedures. Through these procedures, researchers then highlight certain groupings or main items, which are argued to better explain the nature of and even potential patterns in responses to art.

An early example, the Geneva Emotion Music Scale (GEMS), introduced by Zentner et al. (2008; see also Scherer, 2004; Scherer & Zentner, 2001), involved a list of (initially 146) items and focused especially on emotions or other feelings evoked in experience with music. This list was then applied in a series of studies in which (N = 354) individuals were asked to note which responses they most attributed to remembered musical experiences and contrasted against emotions more often "experienced in nonmusical day-to-day contexts" (p. 498). A shortened (66-item)

list was then employed on-site at a music festival, asking individuals to report those feelings that they had felt that day. A confirmatory factor analysis (CFA) supported a grouping of the items into nine "music emotion factors," labelled by the authors, as suggesting experiences of "wonder," "transcendence," "nostalgia," "peacefulness," "power," "joyful activation," "tension," or "sadness," and which, they argued, aligned with many theorists' suggestions for different notable types of music response, and with the authors concluding that "an accurate description of musical emotions requires a more nuanced affect vocabulary and taxonomy than is provided by current [methods]" (p. 513).

A similar, more domain-general, project, the Aesthetic Emotions Scale (AESTHEMOS), was introduced by Schindler et al. (2017) with the aim of targeting responses "that can arise when a person perceives and evaluates a stimulus for its aesthetic appeal or virtues" (p. 2), especially related to engagements with the visual arts but also to music, literature, film, etc. An initial list was compiled by the authors, incorporating 122 items, and applied in an online study asking participants "how frequently they would use [each item] to describe their emotional reactions during an aesthetic experience" (p. 18). A refined list of the 75 most-commonly noted items was next applied in an on-site data collection with individuals who had attended one of 25 different possible events, ranging between concerts, dance, readings, or museum exhibitions. Participants reported "how often" they had felt each item. Factor analyses and post-hoc theoretical adjustments suggested seven higher-order factors, argued by the authors as referring to "prototypical aesthetic emotions," "epistemic emotions," "animation," "nostalgia/relaxation," "sadness," "amusement," and "negative" feelings. The authors related these components to literature on aesthetic engagements and, as above, argued that "to do justice" to the complex engagement with art, "we need to assess a broad range of specific aesthetic emotions and see how they combine in individual aesthetic experiences" (p. 26). (See also, for somewhat similar methodology, lab-based assessments of largely art appraisals by Stamkou et al. (2022; Stamkou, 2022; or earlier museum work by Pekarik et al., 1999, reviewed in footnote).[2]

Promise, but not yet Combination or Distillation: Outstanding Questions with Current Multivariate Approaches

These approaches constitute important advances in our assessment of art encounters, supporting both the theoretical need, and providing an empirical basis, for a multivariate consideration of art experience. However, in their actual application, they remained limited to a data reduction or scale-formulation approach. That is, studies have essentially found semantic similarity between items—suggesting how these, when provided *en masse*, might group together or be used similarly by participants. By further suggesting clusters of items, these approaches may reveal important salient features and even underlying patterns in art experiences. At the same time, current approaches do not yet actually explain *how* these aspects fit together, how

we might assess the relationship *between* identified clusters/dimensions, or whether they could be applied to capture *distinct types* of art experience.

It has been noted that such cross-category or cross-emotional blending, and specific combinations, may be both common and particularly salient for describing experiences (e.g., see Keltner & Oatley, 2022; Schwarz, 2011). Questions regarding how such factors combine have been suggested as necessary next step by authors of the present multivariate reports (Schindler et al., 2017). Even more, it may be specific sequences or *changes* that are particularly important when describing a progressive, emerging experience (Schwarz, 2011; see also Leder, 2013; Pelowski et al., 2017c for discussion in the context of art), raising questions regarding the nature of the actual tested engagements.

Present studies have also collected data following meetings with collections of multiple, often quite diverse stimuli. Zentner et al. (2008), for example, collected reactions following visits to a large festival with multiple musical acts. Schindler et al. (2017; also, Pekarik et al., 1999) report collections following visits to entire exhibitions, museums, or other cultural events. The scope of art engagements captured in such reports is thus presumably very wide and often consists of multiple, disparate experiences (e.g., multiple varied exhibitions in a large museum over the course of one's visit). Thus, from these studies it is not possible to connect reported items to any specific experience, artwork, or even exhibition. This is specifically noted as a limitation by these studies' authors (e.g., see Schindler et al., 2017, p. 32) and is suggested (e.g., Schwarz, 2011) as an issue particularly when using affective or phenomenal items to address experience, where these reactions should, presumably, refer to a specific moment or engagement. Such approaches also do not allow us to consider whether there is evidence for multiple ways of responding, across individual viewers, to the *same* works of art. These issues occur in conjunction with the present means for eliciting reports and/or scale selection that focus on *frequency* ("how often did you have this feeling today?" e.g., Schindler et al., 2017) as opposed to magnitude or particular item importance, or (e.g., Zentner et al., 2008) where identification is based on hypothetical engagements—"what responses do you often associate with the arts?"

Finally, questions can be asked about the included items themselves. Past studies have argued for the importance of emotions or other feeling states of the participants (e.g., 'how they subjectively felt' in an engagement) rather than the emotions represented or expressed in the artworks (e.g., Schindler et al., 2017, p. 2). This follows a line of research (see e.g., Keltner & Haidt, 1999; Keltner & Oatley, 2022) suggesting that especially *felt* responses, and certain patterns or combinations, may be key to unlocking and unraveling the 'black box' of human perception and cognition (see Pelowski, 2015; Silvia, 2005 for similar discussions with art). Similarly, in their final selections of items, past authors often also included appraisals, descriptions, or attributed states (e.g., Schindler et al., 2017; Stamkou et al., 2022), calling into question whether these can be meaningfully combined with reports of felt states, or whether reports may be driven by specific style or content of artworks (e.g., see Stamkou et al., 2022; Zentner et al., 2008).

On the other hand, studies may have also omitted important items. Although several authors (Schindler et al., 2017; Zentner et al., 2008) did include many previously overlooked feelings, such as epistemic, profound/self-transcending (awe, wonder), or self-conscious emotions, which are central to many belletristic and theoretical discussions of the arts, others have specifically excluded terms that the authors acknowledged might be routinely felt but were argued to be "atypical" as specifically art-elicited or to represent more "utilitarian" emotions (Schindler et al., 2017, p. 17). However, it may be such common, everyday responses—confusion, rejection, interest—that are, in conjunction with more notable "aesthetic" states, instrumental in describing experience (see Cooper & Silvia, 2009; Cowen & Keltner, 2017; Keltner & Haidt, 1999; Pelowski et al., 2017c). Similar arguments can be made for other epistemic or knowledge emotions (Fingerhut & Prinz, 2018, 2020; Stamkou et al., 2022), social/self-reflective or other "hostile"/negative emotions (anger, disgust) (Silvia, 2009; Silvia & Brown, 2007) that have tended to be overlooked. For assessments that aim to uncover a general range of differences in, or commonalities between, our experiences, these reactions may be particularly relevant. This, once again, returns to the theoretical and methodological framework underlying the selection of items and their integration. Present studies leave the field without a good guide for what factors should be assessed, why certain aspects may be important, or how to match reports to an empirical identification of patterns underlying our shared responses to art.

Present Paper

In this paper, we introduce exploratory evidence addressing many of the outstanding questions raised above. We do so through generation of items rooted in a theoretical model and use of network methods and latent profile analysis, extending beyond past study designs to better consider and compare evidence regarding multivariate, supraordinate, patterns underlying art experiences.[3]

Theoretically-Guided List of Phenomenal Items and Underlying Outcomes of Art Experience

As a starting point for the present study, we compiled a list of key emotional items, which, unlike past approaches, were derived from a theoretical model of art experience. This model —the Vienna Integrated Model for Art Perception, VIMAP (Pelowski et al., 2017c; see also Pelowski & Akiba, 2011 for earlier iteration)—was created as a combination and extension of previous models of aesthetic or art processing aspects (e.g., Leder et al., 2004; Leder & Nadal, 2014; see also Pelowski et al., 2016 for comparison and review). As shown in Figure 1, the model specifies seven stages, encompassing a pre-engagement/expectations-setting state and several stages of bottom-up processing whereby individuals become aware of and integrate artwork-related visual or other sensual aspects. This is followed by stages related to the grouping, classification, and top-down integration of artwork features with individuals' memory or past experiences and training, culminating in an initial assignment of meaning, relative understanding, and (i.e., generally positive/negative) evaluative and affective response. These preliminary stages are then further coupled with potential secondary, viewer-

centered processes in which an individual may extend from, respond to, modulate, or even revisit their initial reactions to art. This model, we argue, provides a necessary theoretical framework for anticipating, hypothesizing, and empirically testing various aspects of or implications from our encounters with art (see also e.g., Kuiken & Jacobs, 2017 for theoretical and critical review).

Importantly, for the present paper, the model introduced two additional aspects: First, it integrated these stages with hypotheses for specific factors argued to arise within and be tied to each processing stage, with a particular emphasis on affective/emotional items, and other phenomenal states. These items were further presented with the accompanying argument that by assessing these in empirical study—such as via physiological monitoring or behavioral scale-based reports from participants—researchers might not only capture key aspects related to art viewing but also identify and differentiate key patterns in art experience.

Second, by connecting these phenomenal items to the processing stages argued to underlie a progressive experience, the model provides guidance for specific groupings in viewer reports. As shown in Figure 1 (blue boxes) the model proposed five such main varieties: (2) an outcome distinguished by "novelty" or interest, tied to seeing something new and also related to generally positive emotions but also epistemic (e.g., confusion, surprise/learning, but possibly wonder) response; (3) a "harmonious," resonant outcome, with intense positive emotion (awe, absorption), and aligning to discussions of absorbing, flow-like states; (4) a generally "negative" outcome, in which individuals report difficulty, challenge (and concomitant confusion, anger, or negative feelings) and even need to leave or stop an engagement; and, alternatively, (5) a "transformative" reaction in which individuals experience similar initial challenge but move past this through reflection and adjustment with also potential positive feelings. (1) The model also included a generally neutral, "facile" result in which individuals might have a short, shallow interaction, without much notable feeling, but also that aligns to arguments (e.g., see Smith et al., 2017) for how people may often engage art. These outcomes were argued to best be thought of in terms of probability, with—given a particular individual, context, and work of art—the expected frequency of each outcome varying across conditions. At the same time, the outcomes and their characterization (e.g., the specific item patterns) were suggested to be supraordinate, operating on a level that transcends what could be considered the level of the characteristics of the individual viewer and of the respective context of viewing.

In the present study, we employed, for the first time, the full list of items specified in the VIMAP. While this study was not designed as a direct test of the model, this model and list of items provided a starting point for our assessment.

Network Modeling and Latent Profile Analysis: A Basis for Organizing, Connecting, and Identifying Shared Patterns

To statistically evaluate the compiled items, the list was paired with the use of network modeling to visualize and identify communities of interconnected items (see Christensen & Golino, 2021a; Massara et al., 2016), and thus offering many of the

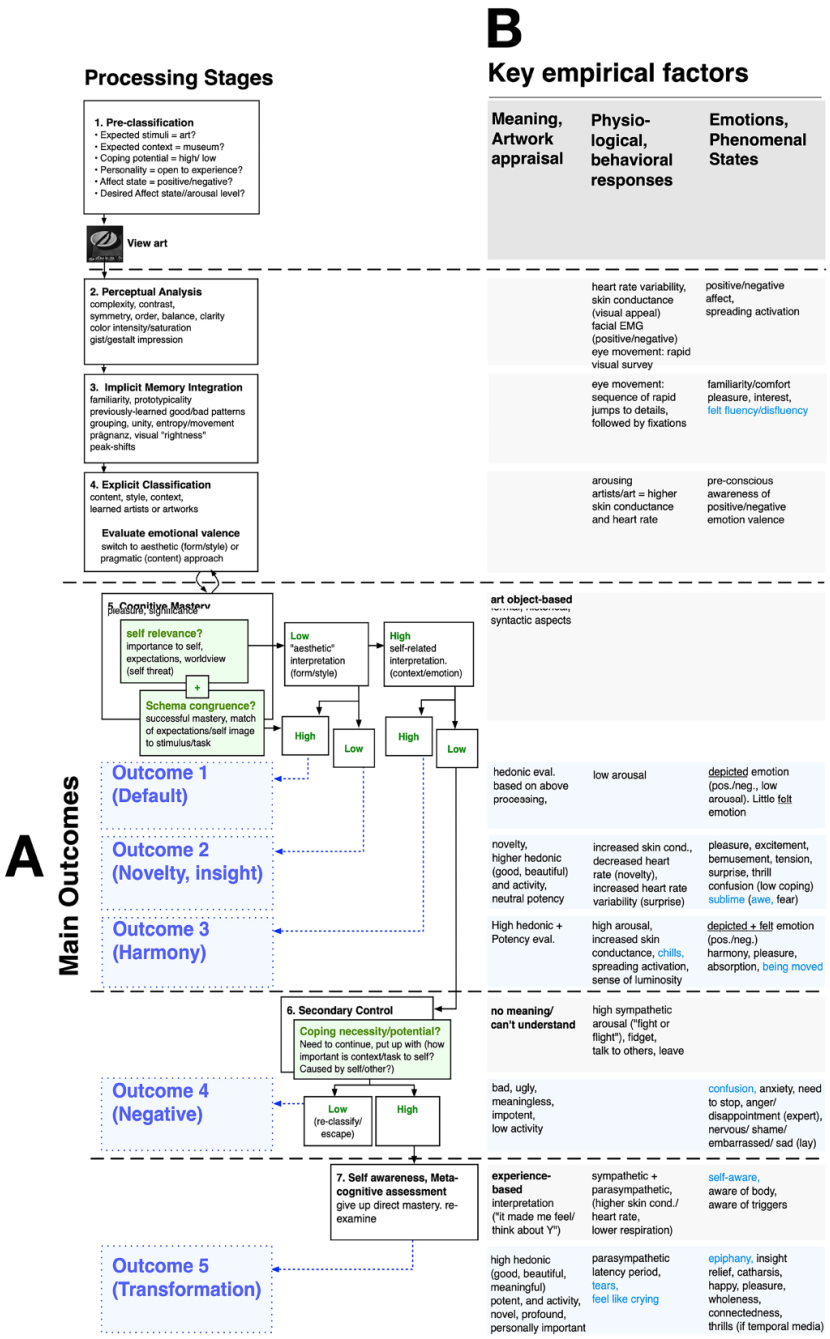

Figure 1. Vienna integrated model of art processing experience (VIMAP; Pelowski et al., 2017c) and posited main empirical factors.
Note: Figure adapted from Pelowski et al. (2017c) Vienna Integrated Model of Top-down and Bottom-up Processes in Art Perception, VIMAP. **A**. Main outcomes posited for art experience and related processing stages (left side). **B**. Empirical factors argued to arise or partially define each processing stage and/or Outcome. "Emotions, Phenomenal States" (far right column) used in the present study as the basis of 45 item list for our assessment, and contains items argued by model authors to be particularly salient targets for differentiating art experience. (Model labels slightly adapted for use in present study; see above paper for original version).

same data combination and reduction abilities as that of factor (FA) or principal component analyses (PCA). At the same time, this technique introduces important advantages. The construction of a network of items, with their interconnections denoted by the strength of zero-order correlations, allows for more specific information regarding the relative importance and the specific interconnection between different items, ultimately also allowing the intuitive visualization of the entire network. The use of network science to identify communities has further been shown to be equivalent or even more accurate than factors/components from more traditional methods (Christensen & Golino, 2021b; Golino & Epskamp, 2017). The approach is further deterministic, providing a data-driven means of community discovery (Christensen & Golino, 2021b).

Recently, this technique has been employed in several art or aesthetic contexts, primarily as a tool for data reduction and to discover underlying structures in multivariate reports (e.g., see, Coburn et al., 2020 and Weinberger et al., 2021 for semantic assessments with architecture; Hayn-Leichsenring et al., 2020 and Specker et al., 2021 for appraisal studies with digitally presented art images; Kühnapfel et al., 2023 and Pelowski et al., 2018 for assessments of some emotions reported following visits to specific museum artworks). Christensen et al. (2023b; see also Kenett et al., 2023) also recently applied this in a hierarchical network approach to study the structure of semantic associations *between* terms used in discussion of (still hypothetical) aesthetic experiences, identifying, albeit with the same limitations regarding their interconnection as in FA, lower- and higher-order structures within experiential reports.

Going even further, an extension of the network science approach can allow for the specific consideration of potential patterns across communities and the entire network. This involves the identification of "core" items within each community (Christensen et al., 2019; Pozzi et al., 2013). By then using an iterative method to assess answering patterns across these selected core items via latent profile analysis (LPA), this allows for the identification of a finite number of answering profiles. This can provide an empirically-grounded method for identifying—across specific artworks, viewers, and contexts—the incidence, number, and potential properties of shared types of art experiences, which can nonetheless be connected back to individual cases. This approach was recently used by our team to consider individual's self-reports of personal 'sublime' experiences (Pelowski et al., 2019). Despite the fact that reports indeed revealed a wide variety of stimuli (e.g., nature, people, art, music) and other contextual and qualitative differences, when individuals were asked to report how these events had felt using a list of cognitive/affective phenomenal terms, this procedure identified *one* distinct pattern that could be fit to 92% of participants. Similarly, Cotter et al. (2018, 2019) conducted studies on recalled instances of feeling like crying with music. Once again, qualitative questions revealed a range of contexts and media. However, assessment of reported feelings using a list of 16 emotion items identified two underlying patterns. These patterns, which could be fit both back to critical and theoretical literature as well as to relatively higher probabilities of incidence for specific individuals or media (see also Cotter et al., 2024),

nonetheless also suggested a connection at the level of feelings and related psychological progressions, but which had not yet been uncovered in a data-driven method.

Coupling our list of items with these network and latent profile methods—in conjunction with an empirical design for on-site data collection of specific encounters with visual art—provided a compelling, albeit exploratory, basis for considering whether we may find a similar manifestation of patterns by which we experience art. In the present study, we focused exclusively on visual art, as one of the main domains for past empirical art assessments and the main target for the VIMAP model; this allowed us to limit possible confounds when combining reports across domains, while also representing a diverse range of experiences.

Method

Participants

The study involved a final sample of 345 people ($M_{age} = 42.3$, $SD = 18.3$, range = 18 to 87 years; 212 female). All were convenience sampled from among paying patrons to our target museum and were further divided into three groups, based on which one of three art rooms they visited (see descriptions below): Impressionist Room (N = 108, $M_{age} = 46.5$, $SD = 17.7$; 61.1% female), Richter Room (N = 113, $M_{age} = 40.7$, $SD = 19.3$; 62.8% f), or Kiefer Room (N = 124, $M_{age} = 40.1$, $SD = 17.4$; 60.5% f). The sample size was based on suggestions for exploratory network and latent profile models (i.e., 300 + participants/100 + per stimuli, given our data structure and aims, see Swanson et al., 2012). The final sample was reduced from 361, with 16 individuals excluded following quality control procedures (see Results).

Participant selection was confined to only single or paired adults, omitting larger groups or individuals accompanying children (see Chang, 2006; Packer & Ballantyne, 2002; Pelowski, 2015). We also refrained from testing during large tours or at times of high crowdedness (Goulding, 2000; Pelowski et al., 2016). No participants used an audio guide or other extra-exhibit aid during the study. Participants had normal or corrected-to-normal vision and no color blindness or other visual impairments (self-reported). The study followed protocols of the ethics board of the University of Vienna.

Stimuli

The setting for the study was the Albertina Museum in Vienna (https://www.albertina.at). This is one of the most important museums of visual art in Austria, hosting, in both a permanent collection as well as temporary exhibitions, a wide range of pre-Modern, Modern, and Contemporary artworks. It is also the 55th most visited art museum in the world, with a large number of international patrons.

As stimuli, we selected three individual rooms of art, each housing distinct sets of artworks, which we treated as unified experiences throughout this study (Figure 2). Rooms were selected to represent artworks differing along two main axes of 'valence' (e.g.,

visually pleasing/affectively positive to unpleasant/negative) and 'abstraction/conceptuality' (mimetic/directly understandable to visually/conceptually abstract or challenging), as assessed by the research team and reviews of art-critical perspectives. Although, of course, this provided only a limited selection of artworks, these were selected because they have been argued to represent main points of division for many viewers when encountering art in museums and, in their combination, offer the potential of evoking a range of outcomes (Leder et al., 2012; Pelowski et al., 2017c).

The selection of the specific rooms was further made to minimize, as much as possible, other conflating factors such as windows or other artworks. The rooms all contained distinct sets of art with one cohesive style and/or by one artist, with the expectation that these would lead to a generally distinct viewing experience (see Pelowski, 2015). First, we included a room of impressionist paintings. All artworks were by renowned masters (Figure 2 for examples). This set was selected because of the generally positive reception by museum audiences, with clear mimetic content. Artworks also depicted themes and used color palettes that are typically viewed as pleasant and thus were expected to perhaps elicit especially positive responses. At the same time, critical discussions also suggest that, for example in the use of mark-making or color, this art type could be seen as novel or even challenging/transformative (see Rollins, 2004) but, of course, could also lead to other responses.

Second, we included a room of abstract paintings by Gerhard Richter. This room (part of a larger, temporary exhibition, "*Contemporary Art: Andy Warhol to Anselm Kiefer*") represented Richter's distinct application of mostly primary colors wiped or squeegeed across the canvas. Although the paintings themselves contained often bright colors and intriguing visual patterns, which could of course lead to a range of emotions or appreciations, previous studies have suggested that abstract works may be less enjoyed or even seen as challenging by lay audiences because they do not offer mimetic interpretation or require a more context-based, cognitive assessment (e.g., Pelowski et al., 2017b). The same aspects, for some viewers, are also argued to provide a seed for new insights or appreciation, as well as—perhaps due to their size or color fields—feelings of awe, absorption, etcetera (Hur et al., 2022; Pelowski, 2015).

Third, we included a room of four large collages/prints by Anselm Kiefer, created using somber colors (black, dark brown) and depicting mimetic yet often ambiguous and somber/disconcerting themes (bunkers, barren fields). These were again expected to evoke a range of responses (possibly especially negative or transformative/insightful), or, in general, to evoke more negative emotions, and potentially due to their rather barren, "ugly" presentations, perhaps even be seen as unrewarding. Note again, participants did not perceive more than one room of art as part of the present study, and indeed, the three rooms were not all present at the same time in the museum. All rooms were roughly the same size and, further, located near the museum entrance, minimizing potential "museum fatigue" or carried-over affect as well as potential for having seen other works of art before participating in the study (Bitgood, 2009; see Pelowski et al., 2016 for review).

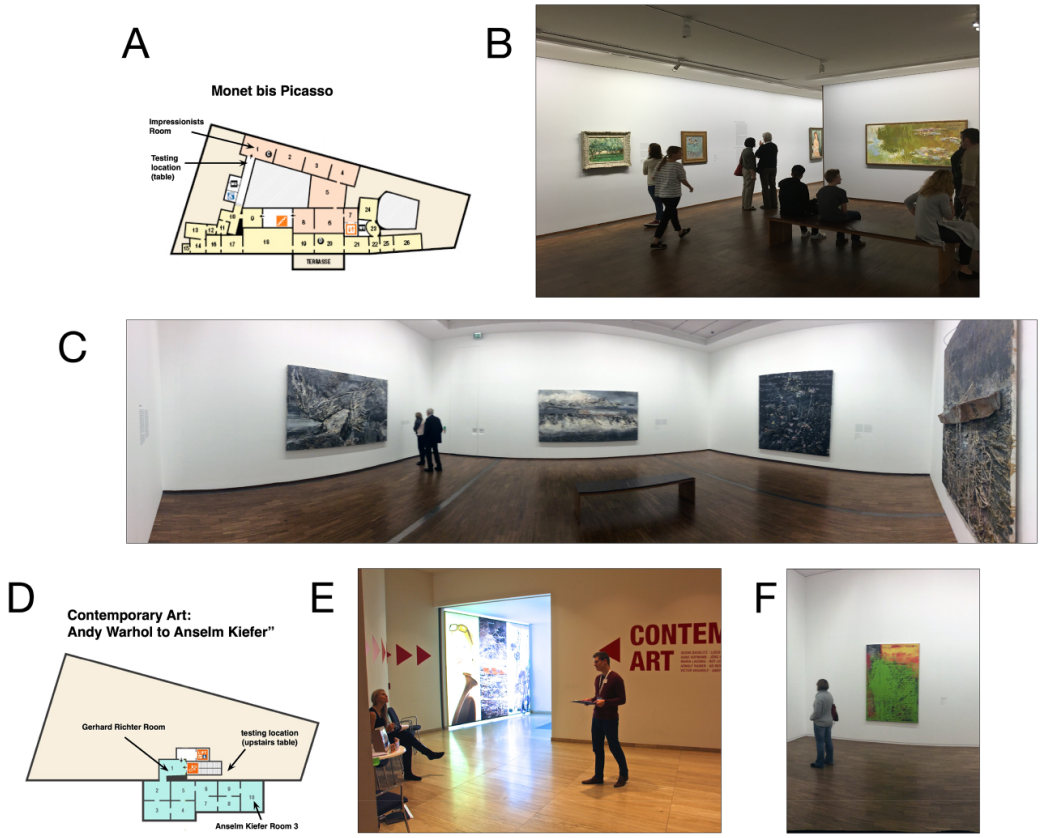

Figure 2. Art rooms and museum testing locations.
Note: A. Museum floorplan showing exhibition and testing location for Impressionist room within larger permanent "*Monet bis Picasso: The Batliner Collection*" exhibition, Albertina Vienna. B. view inside Impressionist room. Visible artworks, from left to right: *Farm in Normandy* (ca. 1885–86, Paul Cézanne), *Two Dancers* (ca. 1905, Edgar Degas), *Young Woman in a Shirt* (1918, Amedeo Modigliani; seen in adjacent room and not included in the present study), *The Water Lily Pond* (1917–1919, Claude Monet). C. view inside Anselm Kiefer room, within "*Contemporary Art: Andy Warhol to Anselm Kiefer*" exhibition (11 July 2016 to 17 March 2017). artworks, from left to right: *San Loretto* (2008), *A.E.I.O.U* (2011), *Im Gewitter der Rosen ist die Nacht* (In the Storm of Roses is the Night) (2014), *Merkaba* (2006). D. floorplan showing exhibition and testing location for Kiefer and Richter rooms. E. testing and recruitment location with study-affiliated researchers. F. view inside Gerhard Richter room, "*Contemporary Art: Andy Warhol to Anselm Kiefer*" exhibition (11 July 2016 to 17 March 2017), with *Abstraktes Bild Nr. 611-1* (1986). All images and exhibitions inside the Albertina Vienna. All artworks © The Albertina Museum, Vienna. The Batliner Collection. All photographs © the study authors.

Procedure

To assess encounters, we followed a previously published paradigm (Pelowski, 2015; Pelowski et al., 2018; see also Figure 2) designed to allow for the capturing, as much as possible, of a 'natural' art-viewing engagement. Participants were approached by a researcher in the museum foyer, near the entrance and just after their purchase of an entry ticket. The researcher(s) explained that they were conducting research on "the

experiences people have with selected art," and asked if they would be interested in participating. Those who consented were given a pre-survey (see *Measures*), then they were led by the researcher to the selected exhibition room (using a quasi-random assignment, as each room was tested on different days) and then instructed to enter and view the artworks. Participants were told to look in whatever manner and for whatever duration that they desired; they were timed but not observed while in the room. Once finished, participants were asked to immediately return to the researcher, who waited outside, and were then led back to the foyer where they completed a post-survey. Each participant viewed one of the three art rooms, and all analyses were conducted between-participants.

Measures

The measures used a mix of Likert-type scales and short answer questions. All participants answered the groupings of questions in the same set order, using a pen and paper form, however with ordering of individual items counterbalanced between participants. Participants could answer in either German or English, with the former version translated and backwards translated by three bilingual speakers. Where possible, we used question batteries that had been previously translated and verified for both languages.

Pre-Viewing Survey. The pre-viewing questionnaire took roughly 10 min and consisted of a series of 7-point scales (1 = "strongly disagree", 7 = "strongly agree", see Table S1 of Supplementary Materials for a full list) addressing viewer expectations for visiting the museum (Mastandrea et al., 2007). Additionally, we assessed participants' mood using the short 10-item version of the Positive and Negative Affect Schedule (PANAS, Mackinnon et al., 1999).

Post-Viewing Survey. The post-viewing survey (~25 min.) included, first, a matched version of the PANAS to assess possible mood changes, and then the following scales in the below order:

Affective/Cognitive Experience. As our main assessment, we asked individuals to report on their feelings during the art experience. This used the set of 46 items highlighted in the Pelowski et al. (2017c) model. See Table A1 of the Appendix for full list of items (as well as noted overlap with other reviewed multivariate studies). This covered a wide range of feelings, including general hedonic (joy, happy), epistemic (novelty, surprise, insight), self-aware or loss-of-self responses, as well as responses noted especially in 'aesthetic' contexts (moved, wonder, absorption). The list also included several items from more routine or everyday contexts (boredom, distraction, confusion, stress. etc.), other moral and social aspects noted above, and aimed to distinguish the included phenomenal terms from other, for example, formal appraisals, with the argument that all included aspects could be reported as having been 'subjectively felt' by a participant. All were presented as unipolar 9-point scales ("while I was

inside the room, I felt (—)" with 0 = "no such feeling" and answers from 1–8 corresponded to some incidence of a feeling, as well as relative magnitude; 8 = "extremely high"), following previous museum experience studies (Pelowski, 2015; Pelowski et al., 2017b).

As a general check for the argument that experiences might often change or evolve, we also included one question assessing whether participants had detected a "change in their emotional experience throughout the art engagement".

Artwork Appraisals. Participants were asked to rate the artworks using a battery of 10 adjectival pairs (see Figure 3 for full list) separated by 7-point bipolar scales (e.g., 1 = "very good," 7 = "very bad"). This approach, based on the Semantic Differential instrument of Osgood et al. (1957), had been applied in several studies of engagements with art (Kühnapfel et al., 2023; Pelowski, 2015; Pelowski et al., 2022). Terms were selected for a distribution of common hedonic/evaluative ratings, artistic value, as well as scales related to "potency" (i.e., potent, sincere) or "activity" (lively, clear) factors (following Pelowski, 2015). We also included one question (7-point scale, 1 = "completely disagree", 7 = "completely agree") regarding whether participants "would pay to see the artwork again".

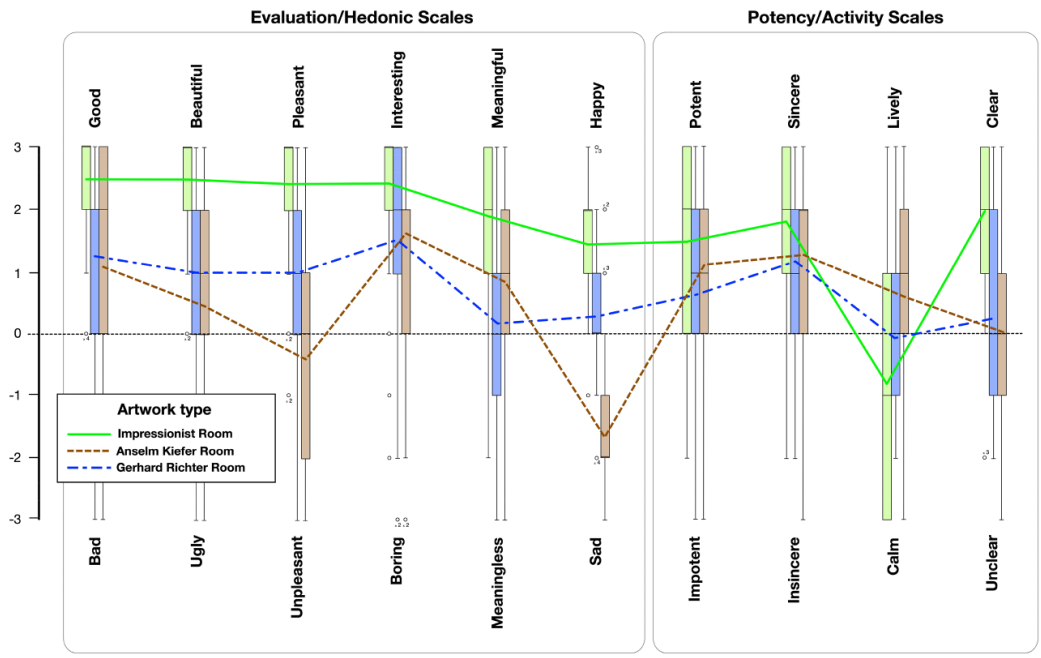

Figure 3. Artwork evaluations of three art-types (cross participant averages and percentiles). *Note:* Results based on reports of total N = 345 participants across three rooms of art, between participants design (Impressionist Room, n = 108; Richter Room, n = 113; Kiefer Room, n = 124). Lines depict mean response values for each art type. Boxes depict interquartile range, and upper whisker and lower whisker depict upper and lower quartile, respectively, for responses across all combined artwork/participant cases. Grouping of scales based on EPA model of Osgood et al., 1957 (see also Pelowski, Gerger et al., 2017).

Personality and Demographic Factors. Finally, we assessed demographics (age, gender, occupation, educational background), self-assessed art understanding, interest, and comfort with viewing and discussing art (based on Pelowski, 2015; Pelowski et al., 2017b), as well as formal art training, involvement in the arts (following Leder & Nadal, 2014), preference for abstract versus representational art (following Mastandrea et al., 2009), the Big Five personality inventory (German/English 10-item short version, Rammstedt & John, 2007), and Need for Affect (German translated short form, Appel et al., 2012; of original Maio & Esses, 2001 battery), which assesses tendency to seek out/avoid affective engagements.

Results

As noted above, of all participants initially recruited, 16 individuals (4.4%) were dropped due to either failure to complete all study portions, asking a partner to complete parts of surveys for them, or, in the case of two individuals, being below the age of consent. A check of answering patterns (i.e., overly monotonous answering) did not reveal issues. Thus, all others were kept for analysis. The opt-in rate for participation, out of all individuals approached in the museum, was roughly 65% (in line with past museum-based research using similar procedures, Pelowski, 2015).

Participant demographic and background information is shown in Table S1 of Supplementary Materials, including between-participant breakdowns by art room. Overall, these were generally in line with past sociological assessments of museum visitors (Hanquinet, 2013). The average age was 42.3 years, 61.4% identified as female; 70.5% had at least a university education. The overall sample tended to visit museums in the range of once every 1–2 months and to have positive scores for scales relating to assessment of their own art knowledge and interest. We also found a range of motivations for visits (Table A2), with highest agreements involving expectations to "see original art in person" but also to "have an enjoyable experience" or "to see things I have never seen before". Participants represented a roughly 60/40% mix of German-speaking (primarily from Austria and Germany) and international tourists, covering ages from 18 to 84 years. Univariate ANOVA/Chi square tests, with Bonferroni correction (see right column, Table S1) showed no significant differences between the art room groups for education, art training/interests, motivations for visiting, as well as for personality and prior mood (PANAS).

Viewing Time and General Artwork Evaluations

Evaluations of the artworks (presented as boxplots in Figure 3) suggested several general differences, which also supported our artwork selection. The Impressionist Room was rated, on average, as the most 'good,' 'beautiful,' 'pleasant'. The Kiefer Room was generally rated on the negative side of scales hedonic scales, as well as sad, whereas the Richter Room tended to straddle the midpoint for ratings, with also lower ratings of 'meaningfulness'. One-way ANOVAs, with Bonferroni correction,

revealed all scales to differ significantly between rooms (adjusted $p = .005$, .05/10). That said, when looking across participants, we found a large ratings variance, with some participants using all possible points for most scales. Similar broad differences were found for viewing time. Individuals spent, on average, 7.3 min ($SD = 4.92$), but ranged from 30 s to 35 min.

Affective/Cognitive Phenomenal Aspects of Art Experiences

The 46 phenomenal items, reported by participants as having been subjectively felt during their experiences, are shown as boxplots in Figure 4, ordered from highest to lowest average magnitude across all participants and art rooms. Once again, we found a wide range of responses. In general, the highest scoring items were positive feelings ('stimulated,' 'absorption,' 'serenity,' 'free,' 'happy') or terms notably connected to 'aesthetic' or art engagements ('harmony,' 'wonder,' 'being moved,' 'sense of profundity'), with negative feelings tending to show lower magnitudes. Responses also suggested broad differences between art types and viewers. In line with our expectations, the Impressionism Room evoked the highest mean responses on scales related to positive affect, and the

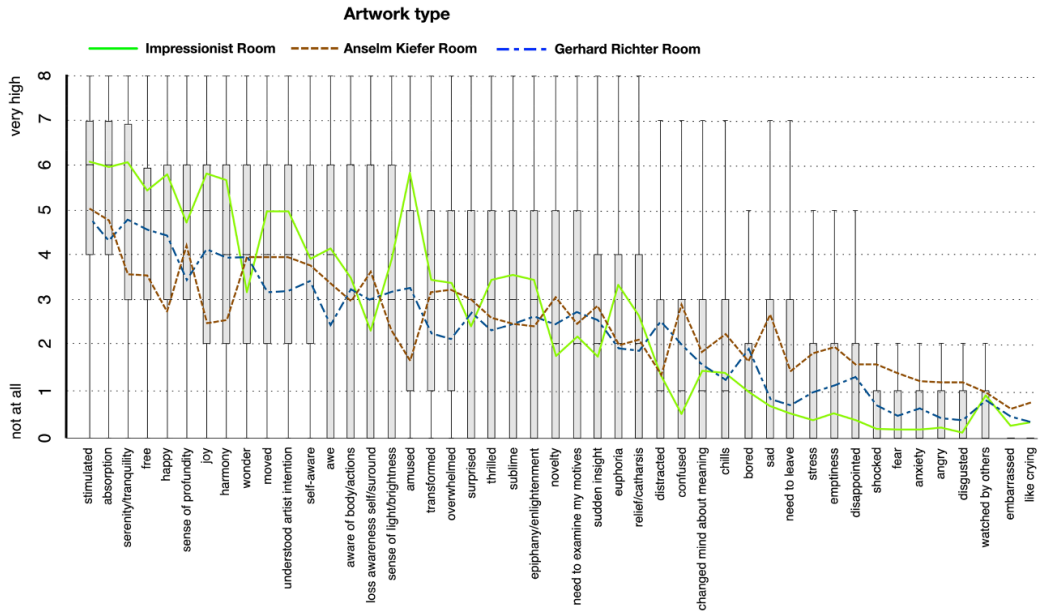

Figure 4. Affective and cognitive items reported as being subjectively felt during art viewing experience (between participant averages and percentiles).
Note: Results based on reports of felt experiences for total N = 345 participants across three rooms of art, between participants design (Impressionist Room, n = 108; Richter Room, n = 113; Kiefer Room, n = 124). Lines depict mean reported mean values, regarding the magnitude to which individuals felt each item while viewing the art, averaged across all participants for each art type. Boxes depict interquartile range, and upper whisker and lower whisker depict upper and lower quartile, respectively, for responses across all combined artwork/participant cases. Affective and cognitive items based on VIMAP model of posited key factors in art experience (Pelowski et al., 2017c).

Kiefer Room tended to evoke higher negative or uncomfortable responses ('sad,' 'angry,' 'anxiety,' 'emptiness,' 'confusion') but also 'novelty' and 'surprise.' The Richter Room tended to have average responses somewhere between the two others. We also found self-reported evidence for changing experience across all rooms, with 73.6% of Kiefer Room visitors indicating that they had experienced a change in their feelings throughout the experience, 62.5% for the Richter Room, and still over half (55.0%) of Impressionist Room viewers. Note, we did not statistically assess for differences in specific item ratings but rather only compared at the descriptive level due to lack of specific hypotheses and the large number of items.

Network Model of Phenomenal Factors Across Art Experiences—Analysis Method

To assess the above collection of affective and cognitive items' potential relationships, we conducted a network modelling analysis, using the following procedure:

Network Construction

To first construct the network, we used the *Triangulated Maximally Filtered Graph* ('TMFG,' Massara et al., 2016; see Pelowski et al., 2019 for study in similar aesthetic context), including the full 46-item set of items. The TMFG algorithm constructs a network of zero-order (Pearson) correlations using a structural constraint—keeping the network planar (i.e., it *could* be drawn on a sphere without edges overlapping) —which limits the number of total edges in the network ($3n - 6$ edges, where n is the number of nodes; see Christensen, 2018 for general overview; Christensen et al., 2019 for discussion of identifying dimensional structures). The TMFG method was applied via the *NetworkToolbox* (Christensen, 2018) package in *R* (R Core Team, 2023). Because this method requires no missing data, we used full information maximum likelihood estimation to retain all participants.

Community and Core Item Identification

We then applied *Bootstrap Exploratory Graph Analysis* ('bootEGA,' Golino & Christensen, 2019; see also Golino et al., 2020; Golino & Epskamp, 2017). This applies a walktrap community detection algorithm (Pons & Latapy, 2006) to the above model to assess the number of *communities* or dimensions that exist in the network (Golino & Epskamp, 2017). The walktrap algorithm uses "random walks" through the model to identify the community a particular node belongs to. The random walks start at each node and then jump from one node to the next, with larger edge weights (i.e., correlations) being more probable paths of travel. Community boundaries are formed, again in a purely data-driven method, with paths occurring more often between likely community members (Golino &

Epskamp, 2017; see Golino et al., 2020 for comparison of the EGA approach to traditional FA/PCA approaches). The bootEGA further applies bootstrap with replacement (Efron, 1979), conducting EGA on each bootstrapped sample, forming a sampling distribution of networks. This allows the researcher to examine the stability of a network's dimensions while providing a median, and thus more generalizable, network structure. EGA and bootEGA were applied with 100 bootstrapped samples using an adapted algorithm from the EGAnet package in R (Golino & Christensen, 2019). The walktrap algorithm was applied to detect network dimensions using the *igraph* (Csardi & Nepusz, 2006) package in R. Quality checks for network and community fit were applied following Kan et al. (2019).

To identify core items that were most central to each community and to the overall network—which could be then used in the following latent profile analysis—we calculated a hybrid centrality measure (Pozzi et al., 2013). This quantifies the position of each node (individual item) in the network based on its connections and relative location ("centralness"). The "hybrid" centrality measure approach is so-named because it is the rank-order combination of multiple centrality measures, maximizing centrality estimates (Pozzi et al., 2013). This approach further focused on hybrid centrality measures, as opposed to, for example, choosing the nodes with only the highest network loading within a particular community (aligning more to previous PCA or FA approaches), because we aimed specifically to represent patterns *across the entire* network, while also representing some items for each community. The top 30% of items within each community were selected (see Christensen et al., 2019).

Resulting Network Model, Communities, and Core Items

The final network is shown in Figure 5, with each circle, or 'node,' representing one cognitive/affective item and connections between nodes indicating zero-order correlations applied iteratively through the TMFG algorithm (see *Note*, Figure 5). Green lines indicate positive, and red lines indicate negative, correlations. The relative distance between any two nodes suggests the strength of their connection as a function of the entire network (i.e., items far apart would have a lower correlation). Across the network, we identified five item communities, denoted by the same node colors in Figure 5, and with the subsequent hybrid centrality measure suggesting 13 core items (bold black outlines in Figure 5; see also Figure 6 for full list).

The first community (1) (purple in Figure 5) contained 20 items tied to generally *Transformation,* self-awareness, and more generally reflecting *Profound* or more-or-less peak moments of experience. Its core items were feeling 'transformation,' having a 'need to re-examine motives,' 'understanding intentions,' as well as a 'sense of profundity,' 'awe,' and 'sublime.' (2). The second community (red) contained 13 items that represented largely *Negative* aspects, and included items argued to be related more generally to difficulty or discrepancy, with core items being 'stress,' 'shock,' 'empty,' and 'embarrassed.' (3). The third (grey) contained four items related, presumably, to generally *Facile* reactions—'disappointed,' 'bored,' 'need to leave,' with the core item, 'chills'

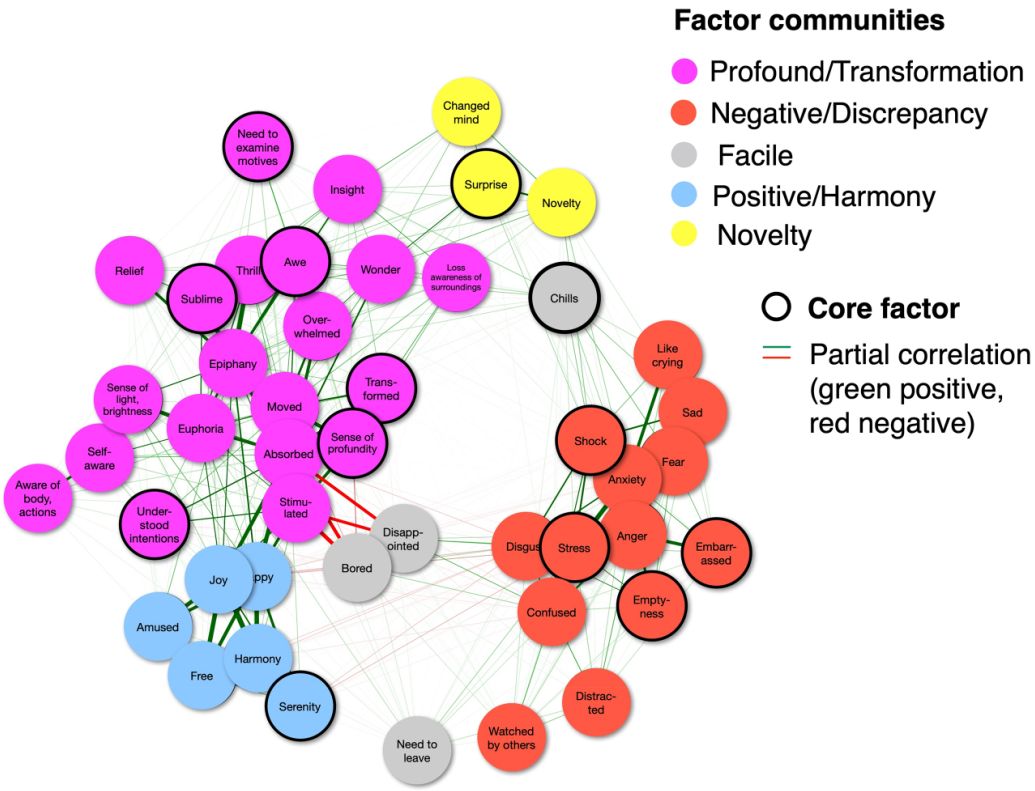

Figure 5. Network model of affective and cognitive reports of museum art experiences across a range of art types.
Note: Results based on reports of felt experiences for N = 345 participants across three rooms of art. Individual nodes (colored circles) depict individual cognitive/affective items from list of 45 used in the present study. Lines (edges) between nodes represent iteratively-added zero-order correlations ($3n - 6$ edges, where n is the number of nodes; Massara et al., 2016). Red lines indicate negative relations; green lines indicate positive relation. Line thickness indicates strength of correlations. Item communities (differently-colored nodes) and core items based on bootstrap exploratory graph analysis (bootEGA) with hybrid centrality measures (Golino & Christensen, 2019). "Core factor" (nodes with bolded outlines) depicts items with most significant network influence; top 30% of items per community selected based on hybrid centrality measure (see Christensen et al., 2019). Community labels assigned by the authors for ease in discussion.

(negatively loaded). (4). The fourth (blue) contained six items that represented generally positive, *Harmonious* responses. Its core item was 'serenity'. (5). The final community (yellow) contained three items appearing to relate specifically to general experiences of *Novelty* or cognitive adjustment/insight—with the core item 'surprise.'

Latent Profile Estimation of Art Experience Patterns

To then further assess whether viewer reports could be fit into one or multiple distinct patterns aligning to possible different types of experience, we conducted a Latent Profile Analysis (LPA) in Mplus 8 (Muthén & Muthén, 1998). This used the

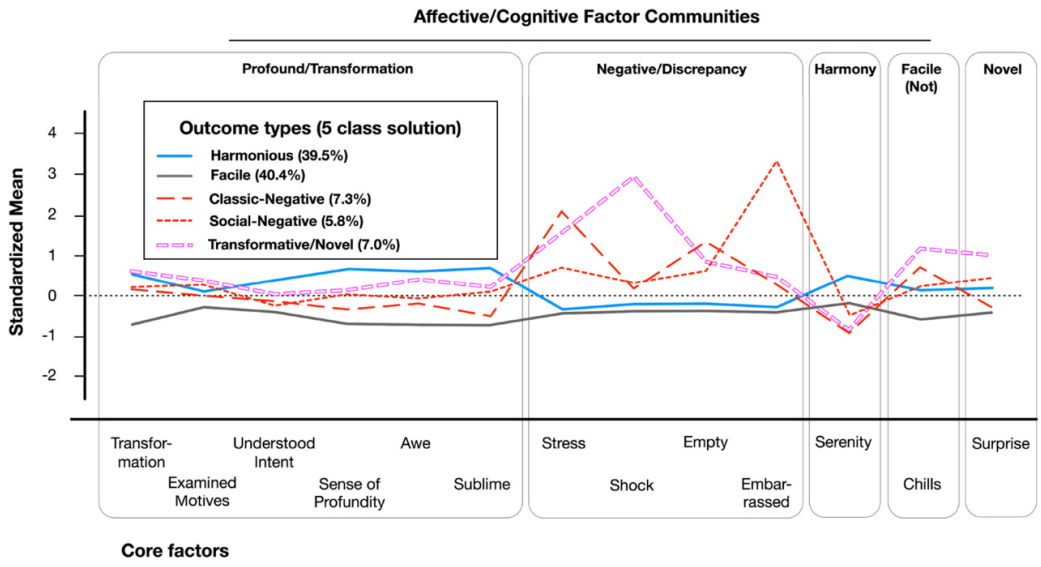

Figure 6. Latent profiles of art experience outcome types, based on core affective/cognitive items: five-profile solution.
Note: Results based on reports of felt experiences for N = 345 participants across three rooms of art. Lines depict groupwise standardized means for 'core' felt affective/cognitive items among individuals assigned to a specific profile, based on latent profile analysis, specifically a five-profile solution (Christensen et al., 2019). "Core factor" (nodes with bolded outlines) depicts items with most significant network influence; top 30% of items per community selected based on hybrid centrality measure (see Christensen et al., 2019). Community labels assigned by the authors for ease in discussion.

standardized viewer ratings (group mean = 0, SD = 1) across the 13 core items above, and tested, initially, one-, two-, three-, four- and five-profile solutions (following similar exploratory study; see e.g., Pelowski et al., 2019). Results were assessed via several statistical fit indices (Table A2, Appendix), including tests suggested to be more robust with smaller samples (Akaike's information criterion, AIC, adjusted Bayesian information criterion, BIC, bootstrapped likelihood ratio test, see Nylund et al., 2007; Swanson et al., 2012).

All multi-profile solutions were found to be better than a one-profile solution. Generally, a five-profile solution showed the best indices' support. Two measures (the Vuong-Lo-Mendell-Rubin Test and the Lo-Mendell-Rubin Adjusted Test) suggested that a three-profile solution could also be a viable fit. A subsequent six-profile solution also did not suggest an improved fit. Further inspection of the five-profile solution answering patterns (see also below) did not suggest the presence of "intensity classes" (i.e., two or more profiles with only differing magnitude; see Silvia et al., 2009; Swanson et al., 2012). To further compare the two possible solutions, individual participants were also assigned to each of the profiles based on the probability of most likely fit, using both a three- and a five-profile model. Assignment probabilities can be found in Supplementary Materials Table S2 (see also Table S3 for the relative assignment of the same individuals to either the three- or five-profile solutions).

In both models, the profiles showed quite clear distinctions for almost all viewers (> 92% best fit probability; almost no spanning or boundary cases). Therefore, as the three-profile solution also tended to show only broad divisions into essentially relatively more positive/negative and/or neutral/facile outcomes, we used the five-profile model for the following assessment (for the interested reader, results of the three-profile solution are however provided in Figure S1 and Table S4 of Supplementary Materials).

To consider the nature of the resulting five profiles, we then looked to the answers of viewers who had been assigned to each profile across the 13 core items (using standardized scores, see Figure 6). As can be seen, the most reported profile (Profile 4, 40.4% of cases) showed the lowest magnitudes of core items (both positive and negative, with the exception of 'serenity') and thus suggesting a generally uneventful, unengaging (e.g., *Facile* following the argument of Pelowski et al., 2017c) result. This was followed by (Profile 2, 39.5%) a profile with relatively high incidence of 'serenity,' 'sense of profundity,' 'awe,' 'sublime,' as well as comparatively low levels of negative emotions and relatively high 'understanding of artist intention,' and thus could be interpreted to align with what Pelowski et al. (2017c) had suggested as a *Positive/Harmonious* outcome.

We also detected two generally 'negative' results. The first (Profile 1, 7.3% of reported experiences) had particularly high 'stress' and 'emptiness,' low 'harmony,' 'transformation/profundity,' and 'novelty' items, but also relatively high reported 'chills,' and thus aligning with a more-or-less '*Classic' Negative* result (e.g., as described in the VIMAP model, Pelowski et al., 2017c). In addition, (Profile 3, 5.8% cases) we detected a similar pattern of high negative and low harmony/profound-related items, but with the notably high presence of 'embarrassment,' and perhaps suggesting a more *Social-Negative* experience (see e.g., Pelowski et al., 2014).

Finally, we found a result (Profile 5, 7%) that appeared to align with a *Transformative* or insightful experience as described by Pelowski et al. (2017c; see also Pelowski & Akiba, 2011). This showed relatively high 'shock' and 'stress,' however also with comparatively lower 'emptiness' and 'embarrassment,' and also with the highest 'surprise,' 'transformation,' 'examination of motives,' and 'chills.' It also had the second highest 'awe'. Note also that, while the general labels of both the profiles and the communities of items above did show some overlap, importantly especially these latter profiles tended to show cross-community combinations, notably regarding negative aspects.

Art Experience Profiles and Outcomes, Ratings, and Mood Change

To consider how the profiles related to rating or otherwise engaging the artworks, we employed auxiliary analyses in Mplus 8 that tested the equality of means (based on the profile assignments at the individual level) across latent profiles, with results similar to analyses of variance or χ^2 tests of independence but adapted to the latent profile approach. Results are shown in Figure 7 and Table 1.

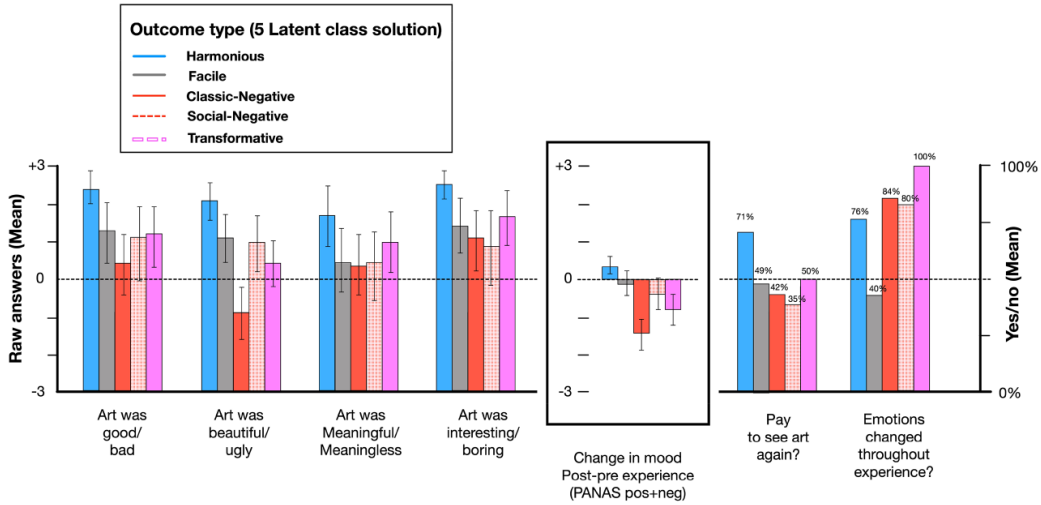

Figure 7. Artwork ratings, change in mood, and viewer report factors as compared across five art experience outcome types.
Note: Results based on N = 345 participants across three rooms of art. Outcome type based on latent profile analysis for shared superordinate art experience outcome types (Christensen et al., 2019). Bars depict groupwise means (with standard errors) for all individuals assigned to specific profile (art outcome) across specific art types.

Artwork Ratings, Viewing Time

For artwork ratings, results were largely in line with arguments from the VIMAP model. The Harmonious outcome (2) tended to coincide with the most positive ratings, with individuals assigned to this profile finding the art most 'good,' 'beautiful,' 'pleasant,' 'meaningful,' and 'interesting'. The Classic-Negative outcome (1) tended to show the lowest ratings for these scales. The Facile (4) and Social-Negative outcomes (3) showed similar, comparatively higher ratings of 'beauty' and 'goodness' than the Classic-Negative case, although lower than the Harmonious. Ratings of 'meaninglessness' were also quite low. The Transformative outcome (5) showed ratings of 'goodness' and 'beauty' in line with the Facile and both Negative outcomes but comparatively higher ratings of 'pleasantness' and the second-highest ratings of 'interestingness' and 'meaningfulness'. All scales, with the exception of 'calm-lively', differed significantly between outcomes (see Table 1).

Viewers of the Harmonious outcome were most likely (71% 'yes') to agree 'that they would pay to revisit the art,' followed by the Transformative outcome (50%), the Facile (49%), and with the two Negative outcomes notably lower (Classic-Negative, 42%; Social-Negative, 35%). Viewers also tended to spend the most time (8.7 min) when having a Harmonious outcome, followed by Social-Negative (6.7 min), the Facile (6.7 min), and then the Transformative (5.4) and Classic-Negative (5.2) outcomes.

Changes in Emotion Throughout Experience and Pre/Post Mood

Regarding the subjective reports of whether participants' emotional experience had changed throughout the encounter, 'Yes' answers were given in 76% of cases for

Table 1. Art Experience Profiles and Artwork Ratings (inc. Willingness to pay, Time Spent Viewing and Changes in Mood): Five-Profile Solution.

% of visitors	Profile 1 *Classic-Negative* 7.3%	Profile 2 *Harmonious* 39.5%	Profile 3 *Social-Negative* 5.8%	Profile 4 *Facile* 40.4%	Profile 5 *Transformative* 7.0%	*Difference statistic* * = sig. dif. [a]	*Significant groupwise comparisons*
Distribution with Artwork Type						$X^2 = 180.52$ *	1/2, 1/4, 2/4, 2/5, 4/5
Impressionists	0%	59.3%	4.6%	36.1%	0%		
Kiefer	14.6%	33.3%	6.5%	30.1%	15.5%		
Richter	6.2%	27.4%	6.2%	55.8%	4.4%		
Would pay to see art again? (Yes)	41.7%	71.2%	35.0%	48.5%	50%	$X^2 = 27.89$ *	1/2, 2/3, 2/4
Emotion changed while looking? (Yes)	83.5%	76.2%	80.0%	40.2%	100%	$X^2 = 121.16$ *	1/4, 2/4, 2/5, 3/4, 4/5
Time spent in room (minutes)	5.0 (.48) [b]	8.9 (.56)	6.8 (1.1)	6.6 (.37)	5.3 (.63)	$X^2 = 31.22$ *	1/2, 2/4, 2/5
Artwork Ratings							
bad – good	4.3 (.34)	6.5 (.09)	5.0 (.45)	5.2 (.14)	5.2 (.33)	$X^2 = 90.90$ *	1/2, 2/3, 2/4, 2/5
ugly – beautiful	2.1 (.29)	5.2 (.10)	3.9 (.38)	4.0 (.14)	3.5 (.28)	$X^2 = 142.45$ *	1/2, 1/3, 1/4, 1/5, 2/3, 2/4, 2/5
unpleasant – pleasant	1.8 (.37)	4.9 (.13)	3.7 (.35)	3.8 (.16)	2.7 (.31)	$X^2 = 94.89$ *	1/2, 1/3, 1/4, 2/3, 2/4, 3/5, 4/5
boring – interesting	4.0 (.35)	5.6 (.08)	3.8 (.43)	4.4 (.15)	4.6 (.33)	$X^2 = 73.76$ *	1/2, 2/3, 2/4, 2/5
meaningless – meaningful	3.3 (.29)	4.8 (.13)	3.5 (.43)	3.5 (.15)	4.0 (.29)	$X^2 = 49.59$ *	1/2, 2/4
sad – happy	1.2 (.30)	3.7 (.16)	3.0 (.39)	2.9 (.14)	1.5 (.26)	$X^2 = 83.11$ *	1/2, 1/3, 1/4, 2/4, 2/5, 3/5, 4/5
impotent – potent	4.9 (.27)	5.7 (.12)	4.4 (.35)	4.7 (.13)	5.3 (.24)	$X^2 = 33.19$ *	2/3, 2/4
insincere – sincere	4.0 (.27)	5.0 (.11)	4.0 (.39)	4.1 (.12)	4.3 (.29)	$X^2 = 36.78$ *	1/2, 2/4

(continued)

Table 1. Continued.

% of visitors	Profile 1 *Classic-Negative* 7.3%	Profile 2 *Harmonious* 39.5%	Profile 3 *Social-Negative* 5.8%	Profile 4 *Facile* 40.4%	Profile 5 *Transformative* 7.0%	*Difference statistic* * = sig. dif. [a]	*Significant groupwise comparisons*
calm – lively	4.1 (.37)	4.0 (.20)	4.5 (.45)	3.8 (.16)	4.8 (.39)	$X^2 = 7.40$	
unclear – clear	2.6 (.34)	4.5 (.15)	2.8 (.42)	3.5 (.16)	2.6 (.32)	$X^2 = 54.33$ *	1/2, 2/3, 2/4, 2/5
Mood Change (PANAS post - pre)							
Positive	−.70 (.21)	+.34 (.07)	−.24 (.23)	−.22 (.09)	+.08 (.13)	$X^2 = 38.31$ *	1/2, 1/5, 2/4
Negative	+.60 (.15)	−.08 (.04)	+.08 (.20)	−.10 (.04)	+.90 (.23)	$X^2 = 37.94$ *	1/2, 1/4, 2/5, 4/5

Note. All scale-based totals converted to 7-point equivalent (1 = strongly disagree, 7 = strongly agree) to aid in comparison. [a] Significant differences (*) were detected between rooms at the equivalence of $p < .05$, following Bonferroni adjustment for multiple comparisons (Adjust $p = .003$ (.05/16)); significant groupwise comparisons listed (far right column) are also significant at $p < 0.003$. [b] Groupwise mean values are reported, followed by standard error values (as output by auxiliary analyses run in Mplus 8). See Supplementary Materials for similar comparisons based on three-profile solution.

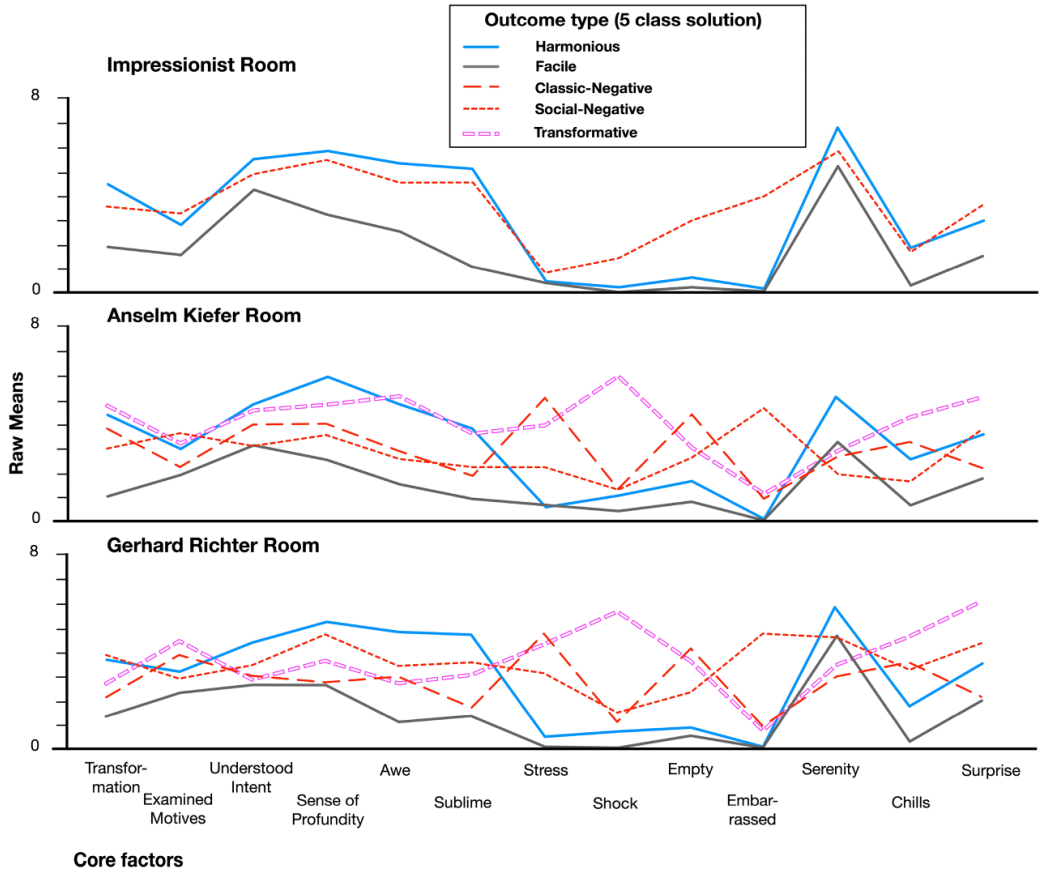

Figure 8. Latent profiles of art experience outcome types, compared between three art-types: based on profile-level mean answers to core affective/cognitive items.
Note: Results based on reports of felt experiences for N = 345 participants across three rooms of art, between participants design (Impressionist Room, n = 108; Richter Room, n = 113; Kiefer Room, n = 124). Lines depict groupwise standardized means for 'core' felt affective/cognitive items among individuals assigned to a specific profile, based on latent profile analysis (Christensen et al., 2019). "Core factor" (nodes with bolded outlines) depicts items with most significant network influence; top 30% of items per community selected based on hybrid centrality measure (see Christensen et al., 2019).

the Harmonious and in 80–84% for both the Classic- and Social-Negative varieties. Whereas 100% of viewers answered positively for the Transformative outcome, 40% of viewers in the Facile outcome reported such changes (see also Table 1). When looking to the pre/post changes in mood (via PANAS), changes for both positive and negative mood varied significantly between outcomes (Table 1). The Harmonious outcome led to the largest increase in positive mood, and a minimal reduction in negative mood. Both Negative outcomes showed a decrease in positive mood and an increase in negative. The Facile reaction led to a decrease in both, while the Transformative led to an increase in positive but also negative mood, with an especially high increase in the latter.

Outcome Types Across the Different Artworks and Viewers

Finally, as expected, we did detect different distributions in outcomes between artworks. The Impressionist Room led to the highest incidence of Harmonious experiences (59% of cases for this art type). This was followed by the Facile outcome (36%) and with only a small handful reporting Social-Negative experiences (4.4%). The Impressionist Room did not show any incidence of Transformative or Classic-Negative outcomes. On the other hand, for viewers of the Kiefer Room, about 2/3^{rds} reported either Harmonious (33%) or Facile outcomes (30%). We also found a higher incidence of Negative (21%, combining Classic and Social types) and Transformative outcomes (15.5% cases). The viewers of the Richter Room were most likely to have Facile reactions (56%) followed by Harmonious (27%) and Negative varieties (12%, combined). At the same time, when comparing the patterns between the art types, despite varying *incidence*, we found rather pronounced correspondence. As can be seen in Figure 8, even the raw answers for the core items led to similar levels of magnitude and relative difference, supporting the generalizability of the outcomes across individual viewers and artworks.

Outcomes and viewer characteristics (Table A3), on the other hand, at the basic demographics and education level, largely *did not* show significant differences. Participant age, gender, level of education, self-assessed art interest, previous art study, and frequency of museum visits showed no notable relation to outcome type. Looking to expectations, participants who had Transformative outcomes did tend to agree more with the expectation of 'learning something,' whereas this same expectation was lower for other responses (again comparing between individuals who had seen the same art type). Personality measures (Big Five Openness, Need for Affect-Approach/-Avoidance) showed no group differences.

Discussion and Conclusion

This study presented an exploratory, proof-of-concept answer to an outstanding set of demands for a multivariate approach to assessing individuals' experiences with visual art. We addressed this by collecting in-depth self-reports of museum visitors' experiences, using a theoretically-guided framework and list of cognitive and affective items across several hundred viewers and three varieties of visual art. Reports were analyzed via emerging Network Modelling and Latent Profile Analysis methods, with the aim to move beyond single-factor or simple data-reduction approaches to meaningfully assess potential combinations across items, viewers, and artworks and, thus, to provide empirical support for the nature of our complex, nuanced—but also potentially more or less shared—ways of responding to art

Multivariate and Potentially Shared Aspects of Art Experience—Results of a Latent Profile Approach

Across the individual viewers, art types, and the individual response items, the results suggested a wide range of differences. At the exhibition level, we found significant

differences in evaluations of hedonic enjoyment, understanding, and meaning (Figure 3), as well as relative economic interest, and even time spent viewing. Similarly, participants reported a wide range of affective/cognitive responses (Figure 4), further supporting our selection of the different art types. This range of responses, at both individual and artwork levels, followed well-established expectations (Darda & Chatterjee, 2023; Gerger et al., 2014; Marković, 2010) and reinforced longstanding arguments for the esoteric nature of viewing art.

At the same time, despite this *local* variance, when looking *across* all individuals and artworks, we did find evidence for similar dimensions and patterns. By considering the combination of 46 affective/cognitive items, compiled from a literature review and theoretical model (Pelowski et al., 2017c) and argued to provide a wide overview of potential art related responses, we detected five communities (Figure 5). These largely aligned with the theoretical model guiding this work and previous multivariate data reduction methods (e.g., Scherer & Zentner, 2001; Schindler et al., 2017; Zentner et al., 2008; see also Table A1) and supported their findings of broad semantic clusters of items in participant self-reports. See also Christensen et al. (2023b) who employed a network modelling method and similarly identified communities related to positive, negative, epistemic, and transformative items. This finding itself is interesting and generally in support of these past claims (e.g., Schindler et al., 2017) that art experiences involve a number of different factors, which tend to cohere into general, and consistent, main groupings, and represent an important multivariate basis for better understanding and addressing art experience.

Going beyond these past approaches—by selecting 13 'core' items from these communities, which best described not only the communities themselves but the variance across the *entire* item network, and subsequently applying a Latent Profile Analysis—we revealed evidence for five distinct patterns in participant reports (Figure 6). These profiles, although found to differ in prevalence across individual viewer characteristics and artworks, were found to be highly similar across cases (Figure 8), with high (> 92%) probability of individual fit, and suggested to be rather stable, distinct, and consistent ways of describing reactions to the different art types. In turn, these results *provide first, preliminary evidence* for this paper's main aim of uncovering potentially supraordinate varieties of art experience. This supports past arguments (e.g., Dewey, 1934; Funch, 1997; Pelowski et al., 2017c) for such underlying progressions or commonalities when engaging art, and speaks against the claim (e.g., Shusterman, 2000 for review) that, given the wealth of factors, experiences are too broad and esoteric to be captured in empirical research. This finding was also in line with emerging research on network modelling approaches, especially with aesthetic topics, suggesting this approach to be a powerful means of teasing out specific, common, defining patterns, or affective journeys underlying complex experiences (Cotter et al., 2018, 2019, 2024; Pelowski et al., 2019).

Detected Experience Profiles and Art Experience

The nature of the detected responses further has central implications for research in empirical aesthetics. Based on the involved core items, we labelled the profiles as

Harmonious, *Facile*, *Classic-* as well as *Social-Negative*, and *Transformative*. These each described distinct ways of responding, with specific items being more or less salient. The Harmonious outcome shows a generally positive, resonant, but also not self-challenging, reaction. The Facile outcome was characterized by low levels of emotion across all items, while also showing generally negative appraisals and evaluations. The Classic-Negative experience corresponded with confusion, anger, and other negative emotions; the Social-Negative showed a similar profile but with the notable addition of 'embarrassment.' Finally, the Transformative outcome was distinguished by high ratings of 'shock' and 'stress,' but also 'awe,' 'chills,' and 'transformation,' blending negative responses with those related to self-awareness and reflection. These findings suggest art's potential to lead to specific profound emotional states, to lead to reflection or self-engagement, to induce anger or discomfort, as well as to result in a largely unengaging and unrewarding experience.

Notably, the defining features of four of these five varieties—Classic-Negative, Harmonious, Facile, and Transformative—do align with the theoretical varieties proposed by the VIMAP model (Pelowski et al., 2017c), which guided our item selection and statistical approach (see also e.g., the recent findings from Christensen et al., 2023b). These profiles also align with other theoretical suggestions (e.g., see, for harmony/absorption, Funch, 2008; Panzarella, 1980; see Lasher et al., 1983; Pelowski & Akiba, 2011 for Transformation; Silvia, 2009 for Negative). Similar arguments can also be found for the embarrassed, Social-Negative outcome (see e.g., Pelowski et al., 2014). Many of the core items themselves (e.g., awe, chills, transformation, wonder) have been noted as key components in art experiences (e.g., see Fingerhut & Prinz, 2020; Pelowski et al., 2017c for review). While again our paper was not designed to be a direct test of the model, and we do not wish to claim that these results are exhaustive, these findings do suggest a matching of top-down theoretical and bottom-up data driven perspectives, providing key support both for the model hypotheses as well as the ecological validity of the results.

Even more, as also suggested in Pelowski et al. (2017c; see also Pelowski & Akiba, 2011), although the specific nature of our responses may be guided by expectations, personal reactions, and context, the present findings speak to a rather psychologically general set of possible reactions whereby we might all respond to a stimulus. Additionally, while viewers may start at the same beginning, the complex nature of reports, *as well as the blending* of both positive and negative items (in the case of Transformation) and the high incidence of self-reported change across all viewers (76% of all cases), speaks to the theoretical argument for an evolving interaction and the need to consider combinations across affectively or semantically similar item sets. This goes a step beyond previous findings that had employed both data reduction/factor analysis, as well as network modelling (e.g., Christensen et al., 2023b) methods, and was again suggested as a necessary extension of past multivariate work (Schindler et al., 2017; see also Keltner & Oatley, 2022; Schwarz, 2011). While again, only preliminary evidence here, these findings and method may provide a compelling basis, and set of key terms, for future research.

Other Implications for a Profiles Approach—Appraisals, Art-Impacts, Methods

Beyond this basic finding of shared patterns in and of themselves, these findings also raise several other implications, especially for how we understand and assess art. First, while we argued for keeping appraisals separate when methodologically assessing the experience, we do find that judgements (hedonic and epistemic appraisals; willingness to pay to see the art again), as well as factors such as changes in mood, were very much related to the specific variety of art engagement (Figure 7). Even more, as with the affective/cognitive patterns, each outcome suggests a nuanced blend of evaluations. For example, whereas a Harmonious experience consistently led to the most positive evaluations, Transformative outcomes showed comparatively high ratings for meaningfulness and interest, but lower appraisals of beauty; these also tended to be shorter visits and leave individuals with less positive moods, while Harmony evoked just the opposite. The Negative, but, interestingly, also Facile, outcomes tended to lead to both negative evaluations and mood impacts.

These findings, as well, broadly matched the arguments in the VIMAP (Pelowski et al., 2017c; see also Pelowski, 2015; Silvia, 2005). The blends of responses, along with the high interindividual variance detected when considering only averaged responses across viewers/artworks, also support previous evidence that relationships between art appraisals are often not linear (Hayn-Leichsenring et al., 2020; Leder et al., 2013; Sidhu et al., 2018; Trupp et al., 2023), and that, as with the experiences with art, simply relying on basic valence, understanding, or arousal may not be the most explanatory approach (Pelowski et al., 2017c). An experience-based analysis that connects outcomes to the underlying process of engaging art, would seem to provide a promising approach.

More basically, the appraisal relations found in the present paper raise implications for institutions, artists, or other stakeholders who wish to understand and provide grounds for certain responses to art. The present findings suggest that specific profiles may be connected to art that is seen as rewarding, understood, or that improves one's feelings—again, below the level of, and perhaps more critical than, the specific artwork. Engagements may also challenge viewers, sparking negative reaction, leading to worsened moods, but also potentially (in cases of Transformative outcomes) to self-reflection and learning. These connections provide compelling suggestions for emerging arguments regarding the need to better understand the varied mechanisms leading to wellbeing, health, or other societal impacts (Fancourt et al., 2021; Trupp et al., 2023). See Cotter et al. (2024) who used an LPA approach to connect generally positive and negative profiles to well-being factors in art visits.

On the other hand, the evidence for rather unrewarding, 'facile' responses, we think is quite important, as especially the former probably matches the way many people engage any given work of art, which does not tend to resonate (see e.g., Smith et al., 2017 for a classic finding of very short durations in average art viewing times even in major museums). This response, as well as 'negative' reactions that also are

well-supported in the literature, supports suggestions for the need to expand our expectations for what can happen in museums or with works of art (for example, see the ICOM definition of museums, which specifically emphasizes the function of museums "offering varied experiences"; https://icom.museum/en/resources/standards-guidelines/museum-definition/). Encompassing a variety of experiences inherently means that not all experiences will have the same impact and, critically in this context, that not all experiences will lead to 'pure emotional positivity'—nor should we probably want this to be the case. By expanding to even more nuanced, distinctive processes, we may open even more descriptive means of analysis and understanding of the varied nature of experiences.

Similarly, outcome level considerations may be key for understanding other aspects of context or anticipating impacts of specific artworks. The finding that our selected art types, although holding the *potential* to evoke similar patterns, showed wide variance in outcome prevalence (Table 1) suggests much fruitful ground for future research. By specifically looking for and quantifying reactions, this method may provide a new means of fitting specific art types to empirical findings. Relatedly, by assessing and comparing experience prevalence, this may open up a theoretically-driven basis for mediation or introducing changes to increase desired results (e.g., see Pelowski et al., 2014 for a preliminary approach in this direction). The lack of relation between outcome types and several other factors—education, art training, personality—found in the present paper, seems to support arguments for the generally open nature of these responses, available without specific backgrounds, given a particular work of art.

Regarding methods, this study adds to the growing collection of research advocating for emotions or other subjectively-felt states as an entry-point to capturing holistic experiences (e.g., Keltner & Oatley, 2022; Pelowski, 2015; Schwarz, 2011; Silvia, 2005). As supported here, these may serve as identifiable indicators of an individual's internal state at a particular moment, which is continuously changing, but also descriptive, as we move through an experience (Pelowski et al., 2017c). The present findings, although not directly compared here, also raise important questions regarding past multivariate approaches that have often used alternative assessments, such as having an individual report how they hypothetically expect to feel or blending reports across a large, undefined number of experiences with art.

Looking to these emotions, the theoretical implications of the specific items included in our study also raise implications. Unsurprisingly, our short list of 'core items' includes several terms classically associated with aesthetic experience, such as 'awe,' 'sublime', 'chills,' which are also noted in recent multivariate approaches and well-established from art historical, philosophical, and psychological perspectives (see Fingerhut & Prinz, 2018). At the same time, the presence of other items—'stress,' 'shock,' 'empty,' 'embarrassment,' 'surprise,' 'understood intent,' 'examined motives'—reinforces the critical role of negative (e.g., Silvia, 2009; Silvia & Brown, 2007), reflective/(meta)cognitive, and 'everyday' emotions. Especially this latter category, which had again been specifically omitted in past multivariate reports (Schindler et al., 2017), was found to be a particularly descriptive, especially when contrasting different global reactions to art. This aligns with past suggestions (e.g., Cowen & Keltner, 2017; Pelowski et al., 2020;

Silvia et al., 2010) that including these may be key for demarcating experience. The range of items also demonstrates the importance of a wider variety of affective and cognitive states that are not only relevant, but central, to creating multidimensional experiences.

Finally, this study adds to a growing body of literature advocating for the use of network modelling, in addition to factor and principal component analyses, as this may provide more varied methods for best describing and capturing experience. Results also provide support for the use of LPA to examine the relationship *between* identified communities/clusters (Cotter et al., 2024; Pelowski et al., 2021) and identify patterns in participant responses across exhibitions. Even with previous studies that have identified emotional factors of aesthetic engagement via emerging network methods (e.g., Christensen et al., 2023b), the addition of LPA to analysis procedures enables us to identify and assess these multi-dimensional, inter-factor relationships as they pertain to and occur in participant self-reports on a population level. This approach, as seen here, may be particularly powerful for assessing a class of engagements as nuanced as our meetings with the arts.

Future Directions and Caveats

While the present study provides support for the methods applied and outcomes identified, this comes with many more caveats and calls for future research. These results should be treated as a proof-of-concept and basis for setting up more expansive, focused studies to dig into many of the implications noted above. We assessed three exhibition rooms that varied in their tone and style, with the argument that this may produce a good starting point for eliciting a range of reactions to art. At the same time, this only represented a small subset of art examples, all 2D paintings. All exhibition rooms were also in the same museum and with a bias towards contemporary artists. We further did not conduct any pilot testing or post-hoc verification of the varied valence and styles (though between-exhibition comparisons provide some insights to this variance). Our sample size, although in line with minimum recommendations available at the time (Swanson et al., 2012), was also only a small subset of possible viewers. To truly provide robust evidence for the implications and applications implied in this work, it will be necessary to replicate and expand the findings started here, incorporating more, and a wider range, of participants and artworks, as well as further experimental controls (e.g., explicit verification of whether participants had not seen other exhibition rooms previously) and stimulus-selection validation procedures.

The list of affective/cognitive terms used here were primarily derived from the VIMAP model (Pelowski et al., 2017c) and its literature review. It would be beneficial to revisit and update this list. Significant work on emotions and aesthetic experience has been done in recent years, as also presented in multivariate approaches (Schindler et al., 2017; Zentner et al., 2008; see also Christensen et al., 2023b). Item inclusions and findings from such studies may provide further insights while expanding the list we used in this study. In particular, recent work has emphasized

the role of embodied states (Cabbai et al., 2023; Fingerhut & Prinz, 2020; Kühnapfel et al., 2024) and social emotions (Sznycer et al., 2021), both of which would be valuable to incorporate in future investigations, especially in light of the Social-Negative outcome identified here. Some studies have also suggested potential cultural differences when it comes to attributed valence of specific feelings or how emotions might be reported (e.g., Keltner & Oatley, 2022; Masuda et al., 2008; but see also Zickfeld et al., 2019 for counter-argument); future work may consider exploring possible cultural effects further.

Although we found a rather striking correspondence, differences between the present findings and the guiding VIMAP model (Pelowski et al., 2017c) also raise interesting demands for future research. The lack of a clear Novel variety, for example, as posited in the VIMAP but not found here, may indicate that such an experience does not occur, or that we were simply unable to reveal it under these circumstances. This outcome is proposed to be thought-provoking/changing but not intensely confrontational, an outcome that may not be easily distinguished from the Facile or Transformative outcomes. It may also be that the selected exhibitions do not lend themselves to this experience type.

The identified Social-Negative outcome also raises questions. This was again very similar to the Classic-Negative profile as suggested in the VIMAP, differing only by lower 'stress' and much higher 'embarrassment.' While this may be a genuine and relevant distinction (e.g., see Pelowski et al., 2014 for discussion of a similar response pattern in a museum study), this should be carefully considered, as a few features of this profile point to it being a possible artifact. Only 20 participants were assigned to this profile, accounting for 5.8% of experiences. This proportion falls on the very low edge of recommendations for latent profile analysis (Muthén & Muthén, 2000; Weller et al., 2020). Across all participants and exhibitions, 'embarrassed' was also the second lowest rated affective/cognitive item, with few participants reported experiencing it at all. These features indicate that the identification of this experience type may be a byproduct of item-phrasing and/or the inclusion of these specific exhibitions. Future work that incorporates a larger, more expansive dataset may address both of these results.

Beyond expanding the present study, future work should also explore these outcomes alongside the numerous other factors of individual, context, artwork aspects, and outcomes that may help to further flesh out and define these responses. This approach is intended to assess experience below the level of 'who,' at a level that can accommodate both trait and state-dependent individual differences. Of course, these factors are likely to influence what kind of experience an individual has in response to a particular artwork in a particular context. Compelling questions can also be asked regarding whether similar patterns might be found for other media or modalities or settings of arts. Further, we asked participants to complete the survey measures outside of the exhibition space, after viewing the art, rather than doing so while inside the exhibition room. Such reports are suggested to be highly correlated (Merrill & Baird, 1980), but the possible distinction between responses to perceived versus recalled stimuli has rarely been investigated.

We also suggest that the current results only be considered in relation to art-museums and visual art, given the nature of the data collection. However, similar approaches could be applied to non-art museums or other cultural settings, and indeed theoretically as implied in both the present methods and the original VIMAP, we would expect to find similar patterns across a wide variety of contexts or media—nor would anything in the basic psychological processes suggested here imply anything necessary regarding these coming from 'art'. Nature, sports, etcetera might show similar results. Exploring these factors, while expanding and building on the findings here, would of course be necessary to truly speak to the actual shared profiles of art response.

Despite these caveats, this paper does provide first evidence for potentially shared patterns whereby we may respond to art, as well as introducing new methods for teasing these apart. While the present results do not constitute a definitive model, we hope that this will serve as a foundation for new explorations and foster the understanding of the multivariate, yet interconnected, ways in which we engage with and experience the arts.

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. In this introduction, we use a generally broad definition of 'Art' as encompassing a wide range of human creative and cultural expressions, products, and activities. We acknowledge the longstanding discussion regarding 'art's' possible definitions or, perhaps more often, what may not constitute 'art'. However, rather than indulge such ontological discussions, in this study, we focus on the *experience* of actual museum visitors in interaction with a set of objects to which most would (and did) assign the label of art, especially as these are contained in a traditional Western 'Art Museum' which these individuals endeavored to visit. We also focus on visual art in our study, leaving as an open question whether these findings would apply to other forms.
2. The "Emotional Palette" by Stamkou et al. (2022; see also Stamkou, 2022), asked individuals to view and report their reactions to sets of artworks taken from a larger collection of images hosted by Google Arts & Culture. These were rated via forced-choice categorical selections using "emotion" and "aesthetic quality" terms. A computational mapping methodology with principal preserved component analysis suggested 25 dimensions claimed by the authors to represent "distinct kinds of experience" (see Stamkou, 2022, p. 57). The authors further created an interactive map with specific artworks positioned at the intersection of dimensions. They suggested that "people conceptualize their interactions with visual art in nuanced [ways]" that "extend far beyond" simple valence or arousal-based measures (Stamkou, 2022, p. 57) and further support the potential promise that certain varieties of reactions might be organized across people, artworks, or art types. For an early approach anticipating data-reduction methods, see Pekarik et al. (1999) who explored "satisfying experiences" across various types of museums. The authors interviewed participants (sample size and nature of interviews not specified) about past visits to museums and asked them to discuss "the possibility of underlying patterns". Interviews identified 14 items (e.g., "seeing the real items," "my children learning," but also "being moved," "feeling a spiritual connection" etc.), which were further grouped into four "clusters on the basis of several different multidimensional analyses" (specific statistical method not discussed). The items/categories were used in surveys with visitors to nine Smithsonian museums, including of art, with visitors asked to specify which applied to their entire visit. The authors concluded that reports differed between exhibitions and visitors but that audiences tended to find "the same types of experiences most satisfying at [a specific] place".
3. 'Supraordinate' refers to higher ranks or orders (Merriam-Webster, n.d.)—in our case, higher order categorizations of experience that are identified based on shared features. Within each of the experiential categories or outcomes we will discuss, there will be variance and smaller scale differences that create the unique and personal experiences (and potentially sub-types of experience). Higher order groups identified will share core, defining (emotional, affective, cognitive) characteristics.

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Appendix

Table A1. Full List of Affective/Cognitive Items Included in Post-Viewing Assessment.

Item (as used in final list of present paper) * designates 'core item'	Hypothesized VIMAP Outcome Location(s) *(terms not in Figure 1 but discussed in text noted)*	Inclusion in AESTHEMOS/GEMS? (final super-ordinate components) location)	Final Network Model Community, Present Paper
absorption/ fascination	3 (Harmony)	AESTHEMOS (Prototypical); GEMS (Transcendence, 33)	Positive/Harmony
amused	2 (Novel) *(also "bemused")*	AESTHEMOS (Pleasing); GEMS (Joyful Activation, 33)	Positive/Harmony
angry	4 (Negative), 5 (Transformative)	AESTHEMOS (Negative)	Negative
anxiety	4 (Negative), 5 (Transformative)		Negative
aware of body/ actions	5 (Transformative)		Profound/ Transformative
*** awe**	2 (Novel), 5 (Transformative)	AESTHEMOS (Prototypical)	Profound/ Transformative
bored	1 (Facile)	AESTHEMOS (Negative)	Facile
changed mind	2 (Novel), 5 (Transformative) (*p. 92/95*)		Novel
*** chills**	3 (Harmony)		Facile
confused	2 (Novel), 4 (Negative), 5 (Transformative)	AESTHEMOS (Negative)	Negative
disappointed	4 (Negative), 5 (Transformative)		Facile
disgusted	4 (Negative) (*p. 100*)		Negative
distracted	1 (Facile)		Negative
*** embarrassed**	4 (Negative), 5 (Transformative)		Negative
*** emptiness**	1 (Facile)		Negative
epiphany	5 (Transformative)		Profound/ Transformative
euphoria	2 (Novel), 3 (Harmony), 5		

(continued)

Table A1. Continued.

Item (as used in final list of present paper) * designates 'core item'	Hypothesized VIMAP Outcome Location(s) *(terms not in Figure 1 but discussed in text noted)*	Inclusion in AESTHEMOS/GEMS? (final super-ordinate components) location)	Final Network Model Community, Present Paper
	(Transformative) (*pp. 112, 114*)		Profound/ Transformative
*** need to examine motives**	5 (Transformative)		Profound/ Transformative
fear	2 (Novel)		Negative
free	3 (Harmony), 5 (Transformative)		Positive/Harmony
happy	5 (Transformative)	AESTHEMOS (Pleasing); GEMS (Wonder, 40, 33)	Positive/Harmony
harmony	3 (Harmony), 2 (Novel), 5 (Transformative) (*p. 96*)		Positive/Harmony
joy	3 (Harmony) (*p. 97*)	AESTHEMOS (Pleasing); GEMS (Joyful Activation, 33)	Positive/Harmony
like crying	5 (Transformative)		Negative
loss of awareness	3 (Harmony)	GEMS (Sadness, 33)	Profound/ Transformative
moved	3 (Harmony)	AESTHEMOS (Prototypical); GEMS Wonder, 40)	Profound/ Transformative
need to leave	4 (Negative), Outcome 5 (Transformative)		Facile
novelty	2 (Novel), Outcome 5 (Transformative)		Novel
overwhelmed	4 (Negative) (*p. 101*)	GEMS (Transcendence, 33)	Positive/Harmony
*** sense of profundity**	5 (Transformative)		Profound/ Transformative
relief	5 (Transformative)		Profound/ Transformative
sad	4 (Negative), 5 (Transformative)	AESTHEMOS (Negative)	Negative
self-aware	5 (Transformative)		Profound/ Transformative
	3 (Harmony)		

(continued)

Table A1. Continued.

Item (as used in final list of present paper) * designates 'core item'	Hypothesized VIMAP Outcome Location(s) *(terms not in Figure 1 but discussed in text noted)*	Inclusion in AESTHEMOS/GEMS? (final super-ordinate components) location)	Final Network Model Community, Present Paper
sense of light/ brightness			Profound/ Transformative
* **serenity/ tranquility**	3 (Harmony)	GEMS (Peacefulness, 40, 33)	Positive/Harmony
* **shocked**	2 (Novel), 4 (Negative), 5 (Transformative)		Negative
stimulated	3 (Harmony) *("increased activation")*		Profound/ Transformative
* **stress**	4 (Negative), 5 (Transformative) (*p. 97*)		Negative
* **sublime**	2 (Novel), 5 (Transformative)	AESTHEMOS (Prototypical)	Profound/ Transformative
sudden insight	5 (Transformative)	AESTHEMOS (Epistemic)	Profound/ Transformative
* **surprised**	2 (Novel)	AESTHEMOS (Epistemic)	Novel
thrilled	2 (Novel), 5 (Transformative)	GEMS (Transcendence, 40)	Profound/ Transformative
* **transformed**	5 (Transformative)		Profound/ Transformative
* **understood artist intention**	5 (Transformative) (*p. 104*)		Profound/ Transformative
watched by others	5 (Transformative) (*p. 100*)		Negative
amazement/ wonder	3 (Harmony) (*p. 97*)	AESTHEMOS (Prototypical)[a]; GEMS (Wonder, 40, 33)	Positive/Harmony

Note, VIMAP refers to Vienna Integrated Model of Top-down and Bottom-up Processes in Art Perception (Pelowski et al., 2017c). AESTHEMOS refers to Aesthetic Emotions Scale (Schindler et al., 2017). GEMS refers to Geneva Emotion Music Scale (Zentner et al., 2008). Items listed in left column appear as in the present study. All were presented as unipolar 9-point scales ("while I was inside the room, I felt (—)" with 0 = "no such feeling" and answers from 1–8 corresponded to some incidence of a feeling, as well as relative magnitude; 8 = "extremely high").

[a]Original paper terminology was "something wonderful".

Table A2. Statistical Indices of Latent Profile Model Fit.

Index of fit	Profile Solution			
	Two Profile	Three Profile	Four Profile	Five Profile
Entropy	0.93	0.85	0.89	**0.91**
LL	−5917.42	−5712.71	−5583.19	**−5503.74**
BIC	12,068.46	11,740.82	11,563.53	**11,486.40**
Adjusted BIC	11,941.57	11,569.52	11,347.82	**11,226.28**
AIC	11,914.83	11,533.43	11,302.37	**11,171.47**
CAIC	11,976.29	11,616.40	11,406.86	**11,297.47**
AWE	12,157.75	11,861.37	11,715.34	**11,669.47**
Vuong-Lo-Mendell-Rubin Test	509.94**	**409.41****	259.06	160.52
Lo-Mendell-Rubin Adjusted Test	503.77**	**404.46****	255.93	158.58
Parametric Bootstrapped LRT	509.94***	409.41***	259.06***	**160.52*****

Note. Lower BIC, Adjusted BIC, AIC, CAIC, and AWE values indicate better fit, as do higher LL and entropy values. *** indicate significantly better fit ($p < .0001$) as compared to next profile of lower number of solutions. Bold text = 'suggested' number of profiles based on fit statistic. LL = log-likelihood; BIC = Bayesian information criterion; AIC = Akaike information criterion; CAIC = consistent Akaike information criterion; AWE = approximate weight of evidence criterion; LRT = likelihood ratio test.

Table A3. Relationship Between Art Experience Profile and Participant Characteristics: Five-Profile Solution.

	Profile 1 *Classic-Negative*	Profile 2 *Harmon-ious*	Profile 3 *Social-Negative*	Profile 4 *Facile*	Profile 5 *Transfor-mative*	*Difference statistic* * = sig. dif. [a]	*Significant groupwise comparisons*
Age	32.1 (±13.9)	42.0 (±18.4)	39.2 (±17.5)	46.6 (±18.5)	32.2 (±14.4)	$X^2 = 29.93$ *	1/4, 2/5, 4/5
Gender (experience types within group)						$X^2 = 4.29$	
Female	6.2%	39.3%	4.3%	43.1%	7.1%		
Male	8.5%	40.0%	8.5%	36.2%	6.9%		
Highest level of education (within group)						$X^2 = 2.35$	
Highschool or below	5.1%	36.7%	7.1%	42.8%	9.2%		
University/Postgraduate	8.0%	40.1%	4.6%	41.4%	5.9%		
Studied art/art history (within group)						$X^2 = 2.39$	
Yes	7.1%	37.8%	6.1%	39.8%	9.2%		
No	7.0%	40.1%	5.4%	41.3%	6.2%		
How often visit art museums or galleries?	3.43	4.02	4.10	3.80	3.83	$X^2 = 3.75$	
Subjective art knowledge/taste/comfort (Pelowski et al., 2017b)							
I am comfortable looking at and discussing art.	5.67	5.88	5.90	5.89	5.96	$X^2 = 0.88$	
I consider myself knowledgeable about art.	3.64	4.35	4.71	4.23	4.17	$X^2 = 5.67$	
Art is important.	5.96	6.21	6.25	5.82	6.46	$X^2 = 11.79$	
I enjoy being challenged by art.	5.07	5.58	5.50	4.94	5.54	$X^2 = 13.45$	
I often have profound experiences with art	4.35	4.98	4.70	4.11	4.71	$X^2 = 16.13$	
	4.99	5.19	4.95	5.12	4.57	$X^2 = 3.85$	

(continued)

Table A3. Continued.

	Profile 1 *Classic-Negative*	Profile 2 *Harmon-ious*	Profile 3 *Social-Negative*	Profile 4 *Facile*	Profile 5 *Transfor-mative*	*Difference statistic* * = sig. dif. [a]	*Significant groupwise comparisons*
I like classic/traditional styles of art.							
I like abstract art.	3.91	4.98	4.50	4.62	5.30	$X^2 = 10.867$	
Expectations for visit to museum (Mastandrea et al., 2007)							
To learn something.	5.31	5.04	4.85	4.46	5.49	$X^2 = 17.44$ *	4/5
To see original art in person.	5.90	6.28	6.00	6.29	6.18	$X^2 = 2.85$	
To see one artwork in particular.	3.28	3.55	4.12	3.43	3.34	$X^2 = 2.18$	
To be able to say that I have been to this museum.	3.71	2.32	3.65	2.08	3.47	$X^2 = 26.93$ *	1/4, 3/4
To see things I have never seen before.	5.89	5.75	5.45	5.50	6.23	$X^2 = 9.16$	
To have an enjoyable experience.	6.18	6.17	6.30	5.62	6.09	$X^2 = 13.10$	
To revisit the art, see it again.	3.44	3.74	3.63	3.18	3.48	$X^2 = 3.49$	
To see one particular exhibit.	3.09	4.50	4.56	4.30	2.93	$X^2 = 16.93$ *	2/5
Personality							
Big Five, Openness	5.36	5.51	5.33	5.32	5.27	$X^2 = 1.50$	
Need for Affect, Approach	5.19	5.38	5.06	5.08	5.06	$X^2 = 5.53$	
Need for Affect, Avoidance	2.67	2.49	2.91	2.40	2.86	$X^2 = 4.75$	

Note. Results based on N = 345 participants across three rooms of art. Profile (art experience outcome type) based on latent profile analysis (Christensen et al., 2019). [a] Significant differences (*) were detected at the equivalence of $p < .05$, following Bonferroni adjustment for multiple comparisons (Adjust $p = .002$ (.05/22)); significant groupwise comparisons listed (far right column) are also significant at $p < 0.002$.

2.2. Five Types of Experience.

Following on the promising results of the first museum study, we conducted a second extended study to more substantively identify and define specific types of art experience. Through an updated literature review and extensive collaboration with members of the ARTIS project consortium—which consisted of experts from empirical aesthetics, aesthetic philosophy, social and phenomenal psychology, cultural policy management, art history, curation, and art education—we developed an extended list of 90 phenomenal terms. With this, we collected *N* = 2747 experiential reports across 31 artworks at 11 institutions across five cities in four countries, compiling the largest database to date of phenomenal art experiences in museums that are tied to individual encounters with specific works of art.

Network modelling distinguished three higher-order communities of items, broadly reflecting positive affect, negative affect, and (meta)cognition/reflection. LPA results again, based on a list of 16 'core' items, supported a five-profile solution, this time defining Harmonious, Novel, Transformative, Disengaged, and Negative Experience Types. These profiles, each with a unique phenomenal character, differentially mapped onto common aesthetic judgements (e.g., liking, meaningfulness) and impact measures (e.g., feeling better, feeling changed). The frequency of the profiles further differed between artworks, while the profiles themselves remained stable and recurrent.

With this large-scale investigation of phenomenal museum experiences, we expand our current notion of the nature and variety of art experience, establishing an understanding of the common patterns that underly these nuanced engagements. We further offer these findings as an actionable framework which can be applied to future investigations across the field of empirical aesthetics.

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Contributions:

The study was conceptualized by MP and JF as part of the funding H2020 project, and I was brought on to conduct the study, supervised throughout the process by MP. I

further developed the study, including the survey measures used and stimuli selection methods. I conducted, coordinated, and managed data collection with 31 artworks, across 11 arts institutions in 4 cities/3 countries. Data collection spanned 14 months, between June 2022 and August 2021, and involved over 35 colleagues, interns, and student assistants. I analyzed all data with the support and guidance of KC. I wrote the original manuscript, and all co-authors provided feedback at various stages.

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Five types of experience underly our engagements with visual art

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Abstract

The visual arts are found across our societies and are tied to a range of cognitive, affective, and physiological impacts. Their widespread engagement remains a core feature of human behaviour and cultural practice. However, systematic empirical investigations on the actual scope and nature of our art experiences are limited, as is understanding of what kinds of reactions we can actually have, how these manifest, and the extent to which responses might be shared or are unique and esoteric. We collected 2,747 reports of individual's art experiences using a theory-driven list of phenomenal items administered in museums across Europe and North America. Network modelling and latent profile analysis revealed five supraordinate experience types. These emerged across artwork-viewer combinations and showed distinct associations to hedonic, epistemic, economic, and well-being outcomes. Our findings challenge reductive accounts of art perception, highlight complex patterned responses, and offer a robust foundation for future applications and research.

Our engagement with the visual arts remains a central aspect of human behaviour. The arts have an immense and invaluable social, cultural, and economic presence in human societies, with millions of people visiting museums daily[1,2]. We constantly encounter works of art—in our homes, our offices, on our phones or computers, and in our cities[3]. Art creation and appreciation is suggested as a defining element of human evolution[4,5], perhaps even of our species itself[6]. Underlying our interest in the arts is the pervasive idea of a complex and multifaceted experience. For centuries, and across cultures, when individuals describe why they find art important, why they seek art out, or what constitutes their favourite examples, they have done so by recounting a variety of affective, cognitive, and physiological responses[7,8]. Art can evoke a multitude of emotions[9–11], lead to diverse appraisals and associations[12], and induce different bodily states[13–15]. Individual experiences can vary greatly, ranging from rather mundane and ambient encounters[16] to deeply positive[7,17], negative[11,18], or even profound and transformative engagements[19–21].

Unravelling the ability of art to evoke such a range and depth of responses is one of the most basic and central topics for related humanistic and social science research[22–25]. Anticipating, collecting, and comparing features of art experience is key for museum and curatorial studies[26–28], art education[29], and especially for psychology, neuroscience, and empirical aesthetics[30–32]. The past two decades in particular have seen widespread growth in empirical investigations with the arts, with researchers targeting a number of factors—appraisals, aspects of meaning-making[12,33], emotions[9,10,34–37], and physiological responses[14,38–40], among others. This has led to key insights regarding what constitutes aesthetic appreciation, preferences for specific works of art, and how preferences relate to specific visual features or individual differences[41,42]. Studies have also worked to trace some broad progressions underlying our perception, such as from an attention to low-level visual properties to higher-order classification, association, and ordering of elements[43]. This has

been coupled with emerging interest in art's relation to more profound emotional states such as awe, anger, wonder, confusion, crying, self-reflection, or sudden insight[19,44–48].

Despite this widespread interest, the systematic empirical investigation of the actual range, scope, and nature of our art experiences remains limited. Research has tended to present a rather narrow view of art engagement, with each investigation targeting only a small subset of relevant elements (see for recent reviews[8,37,49]). Even studies that have begun to examine larger, more holistic collections of art-related aspects, using data reduction and synthesis approaches (e.g., factor or principal component analyses) have not presented concise ways to describe a global experience that could help to anticipate and organize these multi-variate, complex responses[49–52] (for further discussion and review, see [37]). Research is further limited by a lack of ecological validity, as few investigations assess encounters with genuine artworks in natural settings or target the lived, felt experience of such engagements[53–55]. This leaves us without basic answers to what kinds of reactions we *can actually have* when we engage with an artwork, how these manifest in our phenomenal and cognitive processes, and how our diverse experiences, as they occur across individuals, settings, and artworks, might be understood, quantified, and interconnected[8,37,51,56,57].

An even more basic, equally overlooked, question involves whether there is anything *shared* or *potentially universal* within the diverse ways we respond to art. Multiple scholars and studies have implied that art experiences, even beyond basic perceptual processing, may have some primary, common features, tied to the nature of our underlying biology, neuronal structures, and affective or cognitive aspects[7,8,12,37,58–61]. Yet, precisely due to the nuanced, multifaceted nature of our art engagements and the wide range of potential artworks, researchers also argue that each individual experience may be truly unique and difficult, or even impossible, to capture or quantify empirically[25,37,62]. Addressing these questions would not only advance our scientific and conceptual understanding of the arts and their role in our

lives but identifying underlying experience types could also provide a key means for museums, artists, and cultural institutions to anticipate how visitors engage with their collections and shape future exhibitions to evoke an intended experience. Results may also provide actionable responses to emerging interests in applying the arts to cultural policy, health and wellbeing, and other societal challenges[3,63–67], in addition to providing an empirical framework for understanding, organising, and anticipating complex human experience.

We now report a new answer to the question of the nature and scope of our multivariate art experiences. This represents the result of a multi-year research project, funded by the European Union Horizon 2020 Program, in which we worked with an international multidisciplinary team of experts from psychology, neuroscience, art history, philosophy, cultural policy, and art education. As a primary aim, we curated a list of 90 target phenomenal states, including cognitive, emotional, epistemic, and bodily reactions that reflected a representative range of responses that individuals might report as having been felt when viewing art. This list was then applied in wide-scale, on-site empirical studies, conducted over several years and in 11 major museums and galleries across Europe and North America. Individual viewers, representing diverse backgrounds and prior levels of art engagement, were asked to view specific artworks from a representative set balanced for conceptuality, style, and valence. Viewers reported on their felt-experiences using our developed list of phenomenal states[37,50,51,53,68], as well as standard art evaluation items, resulting in N = 2,747 unique viewer-artwork engagements.

The collected phenomenal reports were then analysed via network science and exploratory graph analysis (EGA[69,70]) to produce a map of the interconnections between the phenomenal states. This was followed by a latent profile analysis (LPA[37,71]), which, in an emerging application of this technique, provides a bottom-up means of directly investigating

potential patterns across cases, suggested to represent a supraordinate set of responses that may define our engagements with visual art[37]. The identified experience types, assigned on the individual-viewer level, were further analysed to examine profile-level differences on several impact measures, including artwork evaluations, economic decisions to revisit, and reported changes in wellbeing and personal growth. This multivariate bottom-up approach to identifying patterns in experiential reports is well-suited to empirically evaluate recent theoretical models[8] proposing specific types of art experiences, as well as the implementation of these methods to identify patterns in other artistic, cultural, or otherwise complex human engagements.

Results

Descriptives of all components in the studies—selected artworks, viewer demographics ratings—are reported in Supplementary Materials. The final sample included N = 2,747 art experiences, with each data point representing a unique meeting between one individual and one artwork (N = 31). No participant engaged with more than one artwork within the study; the average number of individual viewers per artwork was 88.6 (*SD* = 15.3, see Supplementary Table 1 for information on all artworks, including by-artwork sample sizes). The viewer population included a broad collection of individual backgrounds, art knowledge, and exposure (56.6% female, Mage= 35.5, hailing from 85 countries; see Methods and Supplementary Table 2 for full demographic reports). Participants' evaluations of the individual artworks showed a wide range on scales across both viewers and individual artwork examples (see Methods, Supplementary Tables 3 and 4, Supplementary Fig. 1), supporting our aim for compiling a diverse set of artworks, representative of what individuals might encounter in a typical museum or gallery setting.

Reported Phenomenal Experiences

Participants' reports of their phenomenal responses felt during their art engagements are shown as boxplots with averages for each of the 90 items, combined across all viewers and artworks in Fig. 1 (see Supplementary Table 5 for the full list of items and supporting references). On average, the highest rated items tended to generally align with responses often associated with the arts—'beauty,' 'admiration,' 'inspiration,' 'pleasure'—as well as terms reflecting more cognitive or epistemic feelings—'interest,' 'fascination,' 'wonder,' 'intellectual challenge'. The lowest scoring items tended to include more hedonically- or socially-negative, states—'anger,' 'disgust,' 'embarrassment,' 'envy,' 'offended.' Once again, and importantly speaking to the main argument of this programme, the reports showed a wide range of responses, with the occurrence, intensity, and combination of items varying across viewers and artworks. On average, each viewer reported feeling, to some extent, 58.1 out of the 90 queried phenomenal states (*SD* = 20.7; range = 3 to 90). Every sampled participant reported feeling at least some items during each viewing, with only 1% (n = 28) reporting fewer than ten distinct items; only 3.5% (n = 95) reported all 90.

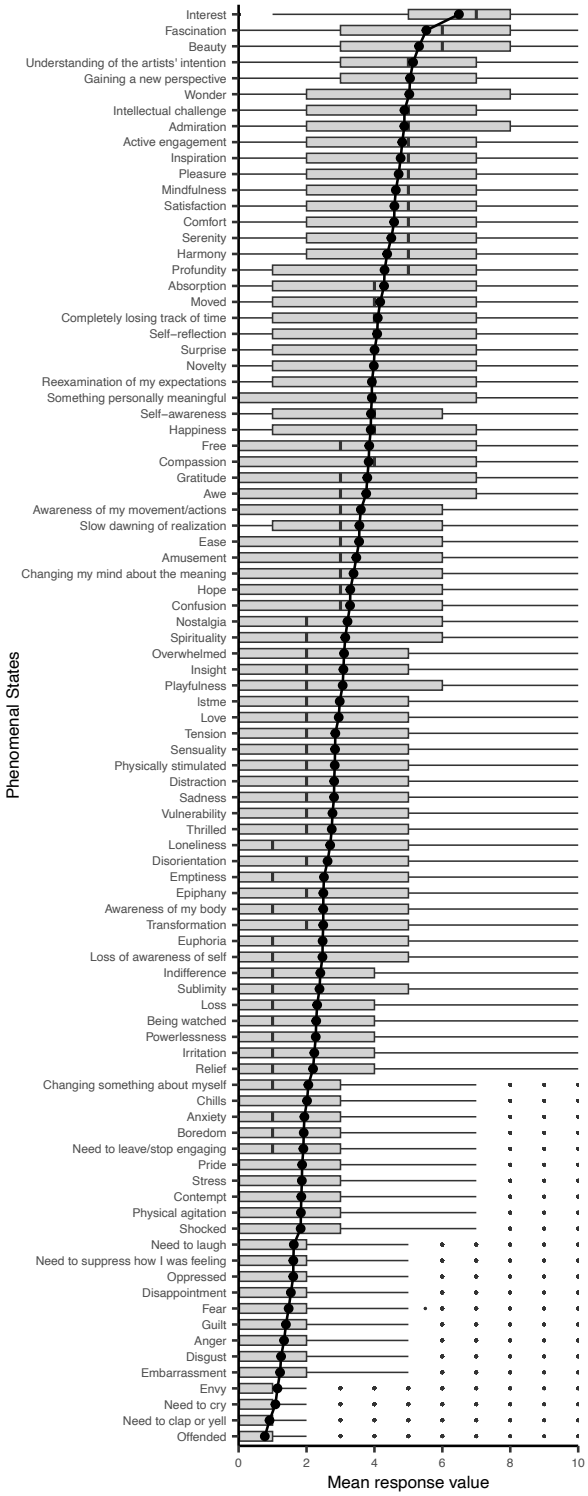

Fig. 1: Reported phenomenal states subjectively felt during art-viewing experiences.
Based on N = 2,747 participant responses to individual artworks. Scores indicate incidence (0 = 'Not at all') and intensity (1 = 'Somewhat' to 10 = 'Very much so) of felt-experience. Boxes represent median ratings, interquartile ranges; large points indicate mean ratings; small dots represent outliers. Source data are provided.

Network Model of Felt Responses Across Art Experiences

To the better consider these complex phenomenal data, the reported items were combined, across all viewers and artworks, as a network model (Fig. 2). This was constructed via hierarchical exploratory graph analysis (EGA[49,69,72,73]) with the full sample of 2,747 participants and a slightly reduced set of 81 phenomenal items (see Methods for network construction and community identification parameters, as well as data reduction procedures; see Supplementary Table 6 for data reduction details and Supplementary Table 7 for network model fit indices).

As can be seen in Fig. 2, this model visualizes the specific interrelation of the phenomenal items and can be read as a general 'map' of these items and their connections as they manifest across individuals' reports of their multivariate art experiences. In Fig. 2, circles (or ‘nodes’) represent individual phenomenal items; connections between nodes (or ‘edges’) indicate Spearman rank-order partial correlations retained by the construction algorithm (*glasso*[69,74–76]). Green edges indicate positive correlations; red indicate negative correlations. Line thickness indicates correlation strength, and the overall structure describes the broad interrelation of the individual phenomenal states.

The colouring of the nodes further represents different ‘communities,’ which constituted highly internally interrelated sets of items which were also distinct from neighbouring sets (following *louvain* detection algorithm procedures[77–79]). Overall, ten communities were detected, containing between two and 16 phenomenal states each and further grouped into three overarching higher-order communities (see Methods for further discussion; see right side of Fig. 2 for items lists). Broadly, these communities reflected key features of individual art experiences which may be expected to co-occur in viewer reports and, by their relative presence and combination, generally describe specific art experiences. These included: three communities incorporating aspects of positive affect, with individual

communities reflecting general positivity, levity, and sensory appreciation, one of which in particular contained items commonly applied to discussions of the arts and aesthetic appreciation, including ‘beauty,’ ‘pleasure,’ ‘harmony’, ‘wonder’; ‘interest.’ Four communities contained (meta)cognitive or self-reflective aspects, involving specific items suggesting captivation and re-examination, relation and connection to others, embodiment, and cognitive engagement. Three communities were also found that contained largely negative affect aspects associated with alienation, melancholy, and discomfort, and with items such as ‘anxiety,’ ‘disorientation,’ ‘anger,’ ‘guilt,’ ‘a need to leave,’ sadness,’ and ‘vulnerability.’

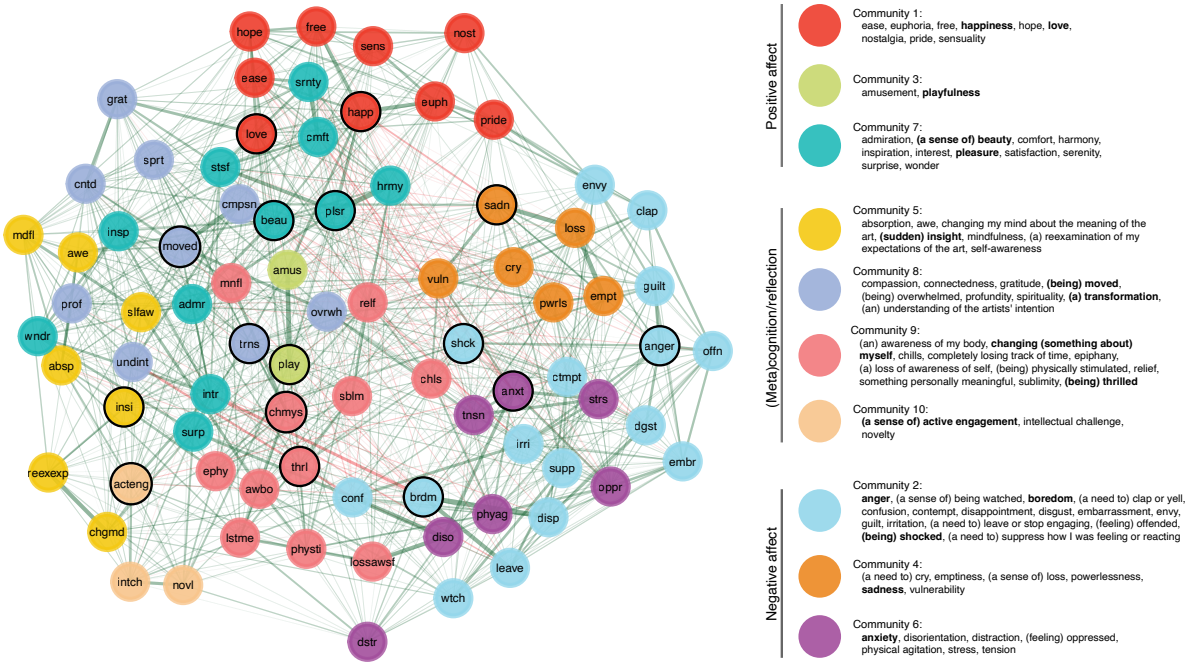

Fig. 2: Network model of emotional-phenomenal reports across museum art experiences.
Results based on N = 2,747 reports of felt-experience of n = 81 emotional-phenomenal items while viewing of one of N = 31 artworks (between-participants). Network created via hierarchical exploratory graph analysis, with *glasso* construction and *louvain* community identification algorithms. ‘Nodes’ are indicated by coloured circles and represent individual response items. For ease of network legibility, nodes are labelled with shortened item labels; full items can be

seen in the righthand column, as well as in Supplementary Table 5. Lines between nodes ('edges') show Spearman rank-order (partial) correlations retained by the construction algorithm; green and red lines indicate positive and negative correlations, respectively, while line thickness indicates correlation strength. Communities are indicated by differing node colours. The numerical ordering of communities is not statistically meaningful and is merely set as the order in which they were identified by the detection algorithm. On the lefthand side, communities are organized in three groups—positive affect, (meta)cognition/reflection, negative affect—indicating higher-order community membership; within each community, items are listed in alphabetical order. 'Core' items (n = 16) are indicated by black, bolded outlines on corresponding nodes and bolded text on the righthand side. These represent the most influential and interconnected items by community; the top 20% of items per community, ranked by hybrid centrality value (minimum one item per community) were selected. Source data are provided.

Experience Type Identification via Latent Profile Analysis

To assess for potential shared patterns across these items and communities, we conducted a latent profile analysis (LPA, in the statistical software Mplus 8[71]). Following suggestions for best practice approaches with complex datasets, this utilized a reduced set of 'core' items, which, collectively, best captured the global network and community structure. Within each of the 10 identified communities, items were ranked by hybrid centrality—a composite measure of indices used to describe the influence of a specific node on the overall network; the top 20% of items per community were retained as 'core'[37] (see bolding in Fig. 2, Methods for detailed selection procedures, and Supplementary Table 5 for all hybrid centrality values). This resulted in 16 extracted, 'core' items. These items were then used in the LPA to produce candidate models with two to seven profiles. Model fit indices (see Methods and Supplementary Table 8 for comparisons of tested two- to seven-profile solutions) and complementary theoretical perspectives[8,37] supported the selection of a five-profile solution.

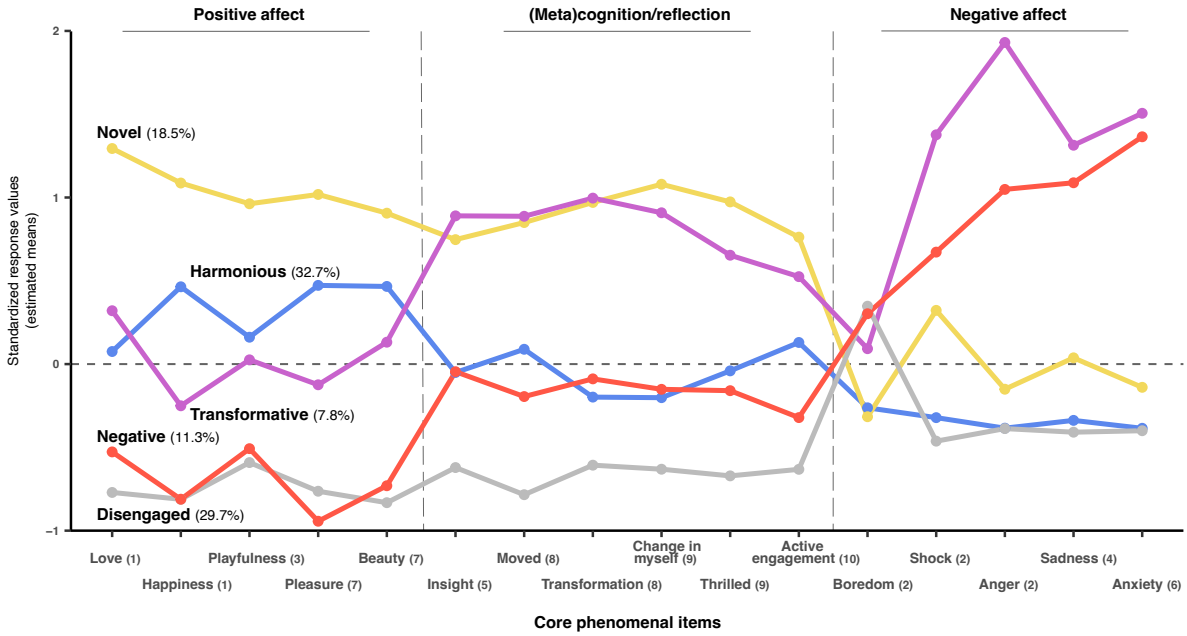

Fig. 3: Latent profiles of five experience types, based on reported phenomenal experiences
Results of a five-profile solution latent profile analysis, based on N = 2,747 reports of felt-experience during viewing of one of N = 31 artworks (between-participants). Points depict groupwise estimated mean ratings of 16 'core' emotional phenomenal items as rated by individuals assigned to that profile group; connecting lines are included to improve profile legibility. Scores are standardized by-item to a sample-level mean of 0 (*SD* = 1). Upper axis labels indicate higher-order network communities for ease of community and profile description. Lower axis labels list the 16 core items and are ordered, within each higher-order community, by lower-order community (indicated in parentheses after each item name); when multiple core items belong to the same lower-order community, they are listed from highest to lowest hybrid centrality (with the exception of 'boredom', which has the lowest hybrid centrality value between the three community 2 items, but is listed first in the higher-order negative affect community given close relation to the (meta)cognitive community). Source data are provided.

The five identified profiles are shown in Fig. 3, which displays the standardized answering patterns that viewers assigned to each profile gave across the 16 core items, reflecting their relative felt-experience. As can be seen, these reflected distinct experience types that we labelled 'Harmonious,' 'Disengaged,' 'Negative,' 'Novel,' 'Transformative'.

Among these, three profiles revealed relatively unidimensional experiences. A *Harmonious* experience outcome was the most frequently reported across all artwork–viewer meetings (32.7% of cases) and was characterized by moderate to high reports in the positive affect communities, including particularly high magnitudes for 'happiness,' 'pleasure,' and 'beauty.' This type was further characterized by low ratings across all the negative affect communities and moderate ratings for the (meta)cognitive communities. The next most frequently reported outcome constituted a generally *Disengaged* experience (29.7%), denoted by the consistently low ratings across all items, with the exception of the single core item of 'boredom' which was had the highest average magnitude for this experience type. A *Negative* profile (11.2%) presented with low ratings across positive affect and (meta)cognitive-related communities, but with relatively high reports of core items belonging to negative affect communities (particularly for 'shock,' 'anger,' 'sadness,' 'anxiety,' as well as, once again, 'boredom').

The remaining two profiles illustrate more multifaceted experiences. A *Novel* profile (18.5%) consisted of the highest reported feelings of items across both positive affect ('love', 'happiness,' 'pleasure,' 'beauty') and (meta)cognitive communities ('change in myself,' 'thrilled,' 'active engagement' but also 'moved,' 'transformation,' 'insight,'). A final *Transformative* profile (7.8%) also saw high ratings of (meta)cognitive items, with the highest reported levels of 'transformation' and 'insight.' However, in contrast to the Novel type, this was blended with negative affect, showing the highest scores for negative affect items of 'shock,' 'anger,' 'sadness,' 'anxiety,' and only moderate positive affect items, although still above the average for 'love,' 'playfulness,' and 'beauty.'

Stability and Prevalence of Experience Types across Artwork-Viewer Cases

The five latent profiles, as assigned at the individual participant level via the LPA procedures, demonstrated high accuracy of these individual-level group membership

assignments, with diagonal average latent class posterior probabilities above 0.9 for each profile (ALCPP; M = 0.918), exceeding best practice suggested thresholds[80,81] (see Methods and Supplementary Table 8 for comparison to other solutions). The profiles were also highly consistent across the stimulus artworks.

At the same time, and as expected, the distributions of the experience type profiles did vary significantly ($X^2 = 717.41$, df = 120, $p < 0.001$; see Fig. 4 for distributions for the full dataset and each individual artwork). Different types of artworks were associated with general differences in experience type prevalence, suggesting some commonalities involving similar styles, content features, or historical periods: for example, see in Fig. 4 similar ratios for Monet/Renoir (late-19th century impressionist paintings), Gonzalez-Torres/Kapoor (conceptual, sculptural pieces), or Nikolic/Sedira (contemporary installation artworks). Overall, the Harmonious (32.7%) and Disengaged (29.7%) experiences tended to be the most reported for many of the selected artworks. Those artworks with the highest percentages of Novel experiences (Sedira, Nikolic, Magical Hackerism, Kiefer) tended to be contemporary installations, while two impressionist pieces (Monet, Renoir) showed the highest rates of Harmonious experience. Two artworks (Kollwitz, Basquiat), which communicated highly charged and legible political messages, showed among the highest occurrences of both Transformative and Negative experiences. See also Supplementary Table 9 for experience-type group differences on participant ratings of the artworks' valence, style, and meaning.

Note however, as can also be seen in Fig. 4, despite differences in prevalence, the occurrence of the five profiles themselves was found to be stable across the different artworks. For all but two artworks, at least one participant could be found that had each of the five experience types.

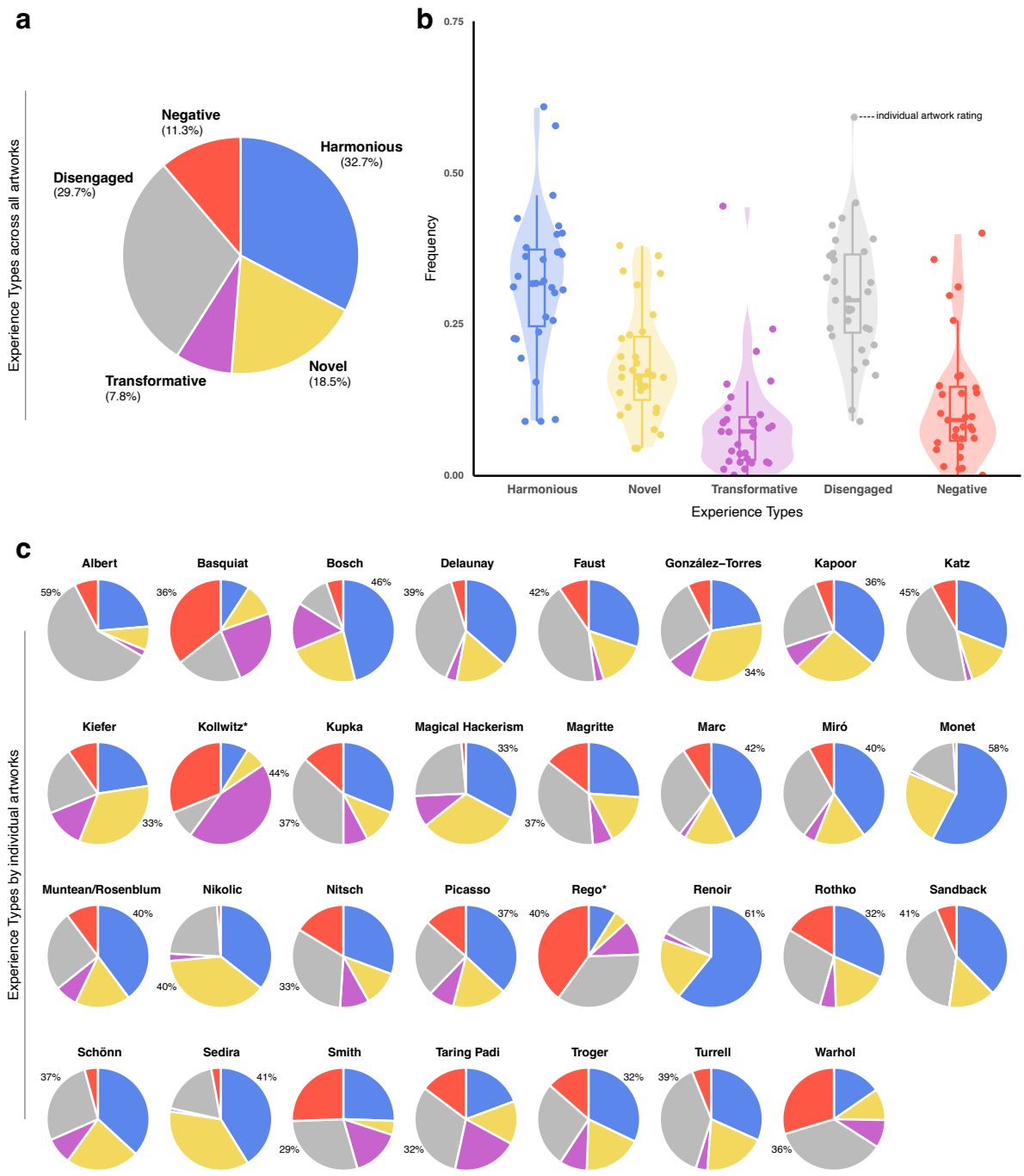

Fig. 4: Frequency of Experience Type occurrence, across all participants and by-artwork.
Plots depict the percentage of participants determined to have a particular type of emotional-phenomenal experience, according to a five-profile latent profile analysis. **a.** In the upper left, experience type frequencies are shown across all participants (N=2,747) and artworks (N=31). **b.** In the upper right, the range and distribution of frequencies, at the artwork level, is shown. Mean sample size is 88.6 responses per artwork (range = 70-111, with the exception of two, Kollwitz and Rego [*starred, n = 45]). **c.** Below, frequencies are shown by-artwork in pie

charts; the frequency of the most-occurring experience type for that artwork is listed. Source data are provided.

Implications and Impacts of Art Experience Types

Finally, we considered how the experience types were related to aesthetic judgements and various implications of the engagements by conducting further auxiliary analyses in Mplus 8. These analyses are comparable to a one-way ANOVA or a Wald's test of mean equality in that they identify group-level differences in secondary variables not directly included in the LPA[71]. We assessed common aesthetic judgements (e.g., liking, beauty, meaningfulness) and economic implications (e.g., willingness to pay to revisit, recommend to a friend), as well as wellbeing and personal-growth impacts (i.e. whether they feel better, like a better person, feel changed). Analyses revealed significant differences in ratings of all variables between experience type groups ($p < 0.002$, Bonferroni corrected for multiple comparisons); select results are shown in Fig. 5 and all details are reported in Supplementary Table 9.

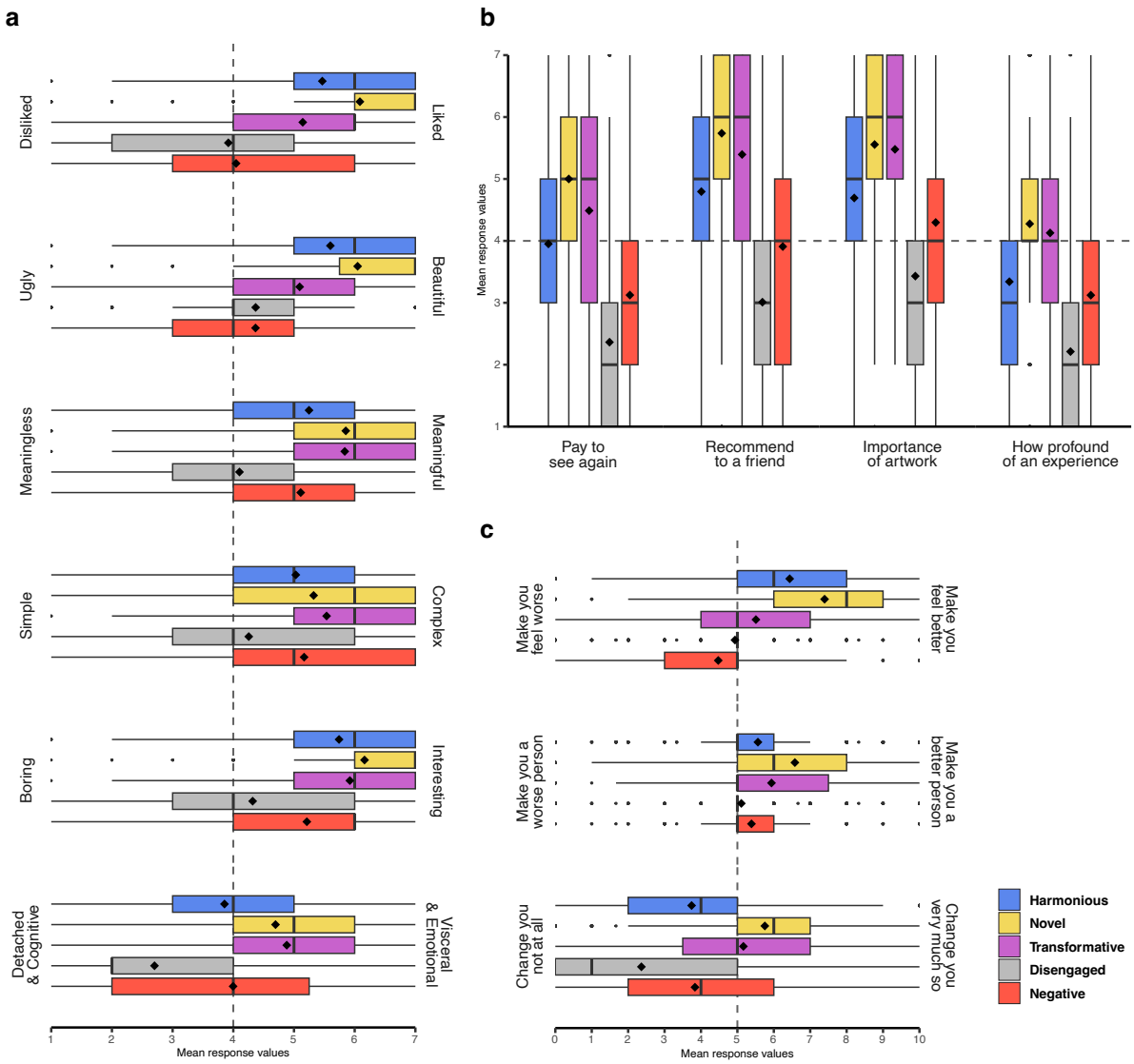

Fig. 5: Artwork ratings, of aesthetic judgements, experiential evaluations, and impact measures, compared between five Experience Types. Results based on N = 2,747 reports of one of N = 31 artworks (between-participants). For all panels, boxes show groupwise medians and interquartile ranges; large points indicate groupwise mean ratings. Individual panels show ratings of **a.** aesthetic judgements (rated on 7 pt. bipolar semantic differentials), **b.** overall perception of experience and artwork (rated on 7 pt. unipolar scales) and **c.** impacts of experience (rated on 11 pt. bipolar scales). For all scales in all panels, overall auxiliary analyses were significant ($p < 0.002$, Bonferroni corrected for 26 analyses), indicating significant differences in ratings between experience type groups; for detailed pairwise comparisons and results of not-shown auxiliary variables, see Supplementary Table 9. Source data are provided.

The Novel, Harmonious, and Transformative experiences were generally rated more highly across variables, followed by Negative and then Disengaged experiences. Novel experiences corresponded with the highest ratings across almost all variables; the Transformative experience was rated as the most complex and most visceral/emotional. Harmonious was rated second on liking and beauty, and goodness, but falls below Transformative experiences on other variables, such as meaningfulness and interest. Disengaged and Negative experiences led to the lowest ratings for artwork liking, beauty, and goodness. In Negative experiences however, artworks were judged as significantly more meaningful, complex, and interesting than by viewers having Disengaged experiences. Negative experiences further showed similar ratings of meaningfulness, and higher ratings of complexity, as Harmonious experiences. Participants who had Disengaged experiences further reported their experience as the most detached and the least profound.

Novel and Transformative experiences saw the highest ascribed importance of the artwork, though those who had a Novel experience said they were more likely to pay to see the artwork again or recommend it a friend. Disengaged, followed by Negative, experiences saw the lowest ratings across all three items.

Novel experiences further had the highest rated impact across questions of whether participants' art experience made them feel better, a better person, and changed them in some way. Harmonious experiences followed for making participants feel better; Transformative experiences were rated higher for making them a better person or changing them. Negative experiences rated lowest for making them feel better, but Disengaged experiences had the least impact on making participants a better person or changing them.

Discussion

This study presents a first-of-its-kind robust, theory- and data-driven approach to identifying how people experience visual art, with a focus on discerning and comparing

nuanced, multi-faceted, but also potentially shared responses across viewers and artworks. To achieve this, we compiled, to the best of our knowledge, the largest repository of art museum visitors' experiences to date, which consists of in-depth self-reports of 2,747 unique art interactions with 31 diverse artworks. The scope of participants and stimuli involved in this data collection was matched by an extensive 90-item measure of phenomenal experience, encompassing both commonly studied emotions and less considered phenomenological, cognitive, and affective states. Participants reported a wide range of phenomenal responses, within and between artworks, as well as varied appraisals and evaluations.

From a hierarchical exploratory graph analysis of the emotional-phenomenal reports, 10 lower-order and three higher-order communities of items emerged, which not only delineated positive and negative affective states, but also (meta)cognitive and self-reflective states (Fig. 2). This community structure broadly aligns with previous multivariate investigations of art experience[37,49–51]. The contrast, or balance, of positive and negative affect as shaping art experience is widely accepted[10,82–84]. Our finding of a third higher-order community incorporating (meta)cognition and self-reflection supports more recent theoretical and empirical findings that such epistemic states are not only framing one's affective experience, but they themselves constitute a specific aspect of felt experience[8,37,49,59,85].

Moving beyond community identification to investigate potentially shared experiential patterns, we applied a latent profile analysis (LPA) and derived five latent profiles, each representing a distinct type of experience that reoccurred across participant-artwork cases (Fig. 3). These experience types—Harmonious, Novel, Transformative, Disengaged, and Negative—largely echo those identified in a preliminary study[37], as well as theoretical models for varieties of art experience[8], while offering key additional insights. Three experiences—Harmonious, Disengaged, and Negative—were indicated primarily by high ratings of items in, at most, one higher-order community.

The Harmonious profile was distinguished by above average ratings of positive affect terms. In these cases, the artwork is well liked, and participants report feeling better after viewing. As the most common experience, the Harmonious type represents a common, pleasurable outcome of arts engagement, seemingly focused on general aesthetic appreciation and fluency[82,86]. The Disengaged experience occurred at a similar rate to the Harmonious, and reveals a clear lack of engagement, by low ratings across all phenomenal items, with the exception of 'boredom.' This finding is consistent with, for example, previous visitor studies that suggest quite short (i.e., 10-30s) viewing times and low levels of engagement even with artworks in world class museums, when averaged at the individual artwork level[16]. The Negative experience mirrored the Harmonious and is broadly characterized by negative affect and low ratings of liking, but higher ratings of meaningfulness, complexity, and interest, particularly compared to the Disengaged type. Participants in this profile reported feeling worse after their art engagement but also like it made them a slightly better person. Together this suggests the Negative experience arises through the rejection of a self-relevant stimulus, thus provoking avoidance or self-protective responses[87].

The final two profiles involved high levels of (meta)cognition and self-reflection, accompanied by states of differing valences: in the Novel experience, such reflection is accompanied by positive affect, and in the Transformative, by negative affect. These results reaffirm the mixed character of the Transformative type, which accounted for just under 8% of all reported experiences (a rate which is comparable to previous investigations[37]). However, the Novel experience, which has often been referred to as a lower-arousal state in the theoretical literature[8], diverged somewhat from previous assessments[37]. In our sample, this profile is associated with the highest ratings of liking, meaningfulness, interest, and greatest positive impacts on wellbeing and self-change. It may be that—while in the Transformative experience, high levels of, for example, 'insight' and 'being moved' arise

through the resolution of an initial, negatively-received challenge—such reflection in the Novel experience occurs when the viewer is open and receptive to the challenge offered by an artwork, or when they engaging with a work that reinforces or aligns with their values while providing a new perspective or application[8,37,63,88]. It is our conviction that these two experiences hold the greatest potential for inducing personal growth and social change[8,63]. Importantly, beyond the identification of these experience types, and their relation to extant theory or small-case evidence, our present approach provided a first bottom-up method for relating these outcomes to one another, showcasing how they may all fit together and arise from the same beginning elements (i.e., reported phenomenal experience).

Further analyses revealed that the profiles differentially associated with a number of evaluative-appraisal measured, further supporting that the profiles represent functionally distinct kinds of experience[37]. This extends to participants' descriptive ratings of the artworks and impacts of the experience, with significant differences found between the experience types for all variables, except for ratings of 'style' (see Fig. 5 and Supplementary Table 9). Overall, Harmonious and Novel experiences were rated as the most liked, followed by Transformative, then Negative and Disengaged; ratings of meaningfulness however are highest for Novel and Transformative experiences, then Harmonious and Negative, and are significantly lower for Disengaged experiences. Our finding that the profiles have a different relationship to 'liking' than 'meaningfulness' supports previous arguments that these judgements, while closely related, reflect distinct aspects of experience and differentially contribute to broader effects of arts engagement[66]. Here specifically, results suggest that perceived meaningfulness (and thus self-relevance[8,89]) may contribute to the likelihood an individual's experience is ultimately Harmonious or Novel, or Negative or Disengaged. Similar patterns are seen in the impact measures, particularly for ratings of whether participants felt worse/better or like a worse/better person after their art experience.

Conducting groupwise analyses by experience type allows us to not only examine potentially multimodal variance between appraisals and impact measures but to explicitly tie these relationships back to emotional, cognitive, and phenomenal experience.

It is further notable that, across our full collection, we identified a collection of five possible experiences. This presents a wider variety of distinct profiles, which are still theoretically- and empirically-grounded, as compared to both previous museum studies with less expansive methods[19], and also studies which have used a similar latent profile method to investigate complex, but also more specific responses to art (e.g., the need to cry[90] or experiences of the sublime[91]). We can further speak to the generalizability of the profiles, as they recur between individuals and across artworks, with at least one person reporting each experience type with all but two artworks. The apparent stability of the profiles speak to a psychologically general set of possible experiences individuals may have when engaging with an artwork or other stimulus[8,12,49,50,82,92].

Potential limitations of our study include possible self-selection biases in our participant sample, as our participants first elected to visit a museum, and then elected to participant in our study[53]. As such, we cannot necessarily say that the frequency of the identified experiences is representative of all experiences had by a general population, but of museumgoers in Europe and North America[53,93,94]. The character of the experience types, however, is theoretically expected and demonstrated here to be consistent between individuals[8,37]. Regarding the selected artworks, we sought to include a variety of styles and historical periods (Renaissance, Realism, Impressionism, Pop Art, Contemporary, Conceptual) and settings (museums, galleries, Biennales) (see Supplementary Figure 1 and Supplementary Table 4). However, the set of stimuli was also of course necessarily limited. We especially acknowledge an overrepresentation of Western artists and art styles, largely due to the European and North American museum and gallery settings investigated. This

Western emphasis extends to the participant population. We did have participants from 85 countries, though the vast majority were from Europe or North America. It would be valuable to assess the applicability of this experience type framework to more non-Western art styles and audiences. Theoretically, we expect that the variety of experiences should be relatively stable between disparate stimuli and populations[8], though there are some cultural differences (particularly regarding the ascribed valence of certain emotions; e.g., pride[95]) that may influence how the profiles are interpreted[96–101].

Our results represent a significant advance in our understanding of a human phenomenon as complex as art experience[7,8,102]. The stable recurrence of experience types across individuals and artworks supports a common phenomenal and cognitive foundation to such experiences, grounded in subjective felt-experience[85]. With this study, we add to the growing collection of research using reported phenomenal responses as an entry point to capturing experience[35,49–52], as well as those using network modelling to explore the semantic space of emotional experiences[14,37,49,52,68]. Results also bolster support for the addition of LPA for moving past the identification of communities, factors, or principal components to articulate the multivariate relationships between such dimensions[37,91,103]. The groupwise classification facilitated by the LPA provides a single descriptor of participants' experiences which is both succinct—and thus functional for later groupwise analyses and applicable to future research—and deeply informative—as each individual participant's profile assignment is grounded in a comprehensive, data-driven assessment of shared, highly nuanced patterns in felt-experience.

This framework has further implications for public health and policy officials by providing a tool for better articulating wellbeing benefits and other (pro)social impacts of arts engagement[3,63,64] and grounding these impacts in individuals' own felt-experience of an art visit or other intervention. In particular, the Novel experience appears promising for

applications to social prescribing[104–108], as a type of experience which is associated with both improved affect and self-change. This also suggests interesting potential connections to emerging discussions in aesthetic philosophy (i.e., "aesthetic cognitivism"[31,62,109]), which propose that one of the unique, historically-persistent potentialities of the arts is their ability to reveal new ways of perceiving or understanding, in certain cases. This particular finding of the Novel experience type—which challenges previous suggestions that one can either feel better or be changed from an art experience, but not both[8]—indicates that it will be important to investigate how individuals cognitively 'move' through their engagement with an artwork to arrive at a specific outcome, by returning to theoretical models[8,12] and integrating additional methods in future investigations[54,110–114]. Not only will such work have an impact on our understanding of the mechanisms underlying art experience[3,63,66,115,116], but it will also have critical implications for current efforts to apply the arts to individual and societal challenges[104,106,117,118]. To best advise health and cultural policy experts, we must work to further understand the conditions necessary for and impacts of the various experience types. This understanding will also be more broadly valuable to museums and galleries looking to understand the experiences of their patrons and how the different experiences shape future engagement behaviour (e.g. willingness to pay, recommend to a friend)[2,119–121]. Beyond assessing visitor engagement, curatorial teams may find use in these types of experience as a guide for designing exhibitions or interventions that lead individuals to a particular outcome and lasting impact.

This method of classifying art experiences according to phenomenal reports will be directly applicable to future investigations, as we devise and validate methods for researchers to use the list of 16 'core' items in new studies to identify these five profiles of experience from new participant reports in future studies (i.e., confirmatory LPA with deterministic parameter constraints[122–124]); our team has already begun to test this application with

encouraging results[125]. Such an approach holds promise for advancing investigations of personality and individual differences[42,126–128], contextual and framing effects(Abbasi & Hossain, 2013; Golino & Christensen, 2025)[53,54,111,129–132], and the neuro- and physiological aspects of art experience [8,59,89,114,125,133–135]. While we focused here on visual arts in museums, the identified profiles are grounded in common cognitive processes and domain-general states which can occur and be experienced in a variety of contexts. This conceptualization and categorization of felt-experiences may then be applied and studied with respect to other art forms—theatre/performance, music, public art/installations[136–140]—or even experiences of cultural stimuli and events more broadly—religious experiences, architecture, landscaping/nature, sporting events[8,20,141–144].

Through this large-scale investigation of museum visitors' phenomenal experiences, we distilled five patterns which describe the nuanced, but shared, ways in which people experience art; the framework we present provides both an empirically grounded foundation and robust methodological approach for understanding, quantifying, and applying the complex, human phenomenon of art experience.

Methods

Participants

The study included a final sample of 2,747 individuals (M*age* = 35.5, *SD* = 15.6, range = 18-85; 56.6% female, 2.7% non-binary/other; see Results and Supplementary Table 2 for full details and breakdown by artwork) hailing from 85 countries (21.6% German, 12.2% Austrian, 10.7% American, 7.3% Italian). All participants were convenience sampled from among the regular visitors of our target institutions (N = 11) and participated for no compensation. Within the scope of the study, each participant viewed one of our target artworks, from a selection of N = 31 across the various institutions (M = 88.6 participants per artwork; see Supplementary Table 1 for details). This population is well aligned with the

usual sociodemographic profile of museum studies[1,53,120], as well as European and North American cultural institutions more broadly[93,94].

This final sample was reduced from an original 3,231 participants who initially signed an informed consent form, with 484 individuals excluded: 246 for incompleteness, defined as missing 9+ items/10% of the 90 phenomenal states, and 238 for not passing at least one of the two attention checks embedded in the survey. Participant retention and inclusion rates are within expected levels for museum studies[53]. Sample size targets (approximately 100 participants per stimulus, for 25-30 total stimuli) were set according to recommendations for exploratory network and latent profile models, given our aims, data structure, and network size[69,76,145].

The participant sample was recruited following suggested best practices for studying museum art experiences[37,53]. Participant selection focused on single or paired adults, excluding those visiting with children or in larger groups[19,146,147]. Small groups were occasionally included, particularly if one member of the group was approached first and others wished to participate. In these cases, group members were given the explicit instruction to please not discuss their experience or answers until they had completed the survey. We also refrained from testing during large tours or at times of high crowdedness[121,148]. No participants used an audio guide or other extra-exhibit aid during the study. The study followed protocols of the ethics board of the University of [redacted for peer review].

On average, participants reported relatively moderate-to-high art liking (M = 8.27 on a 10-point scale, SD = 1.66), moderate art knowledge (M = 5.19/10, SD = 2.11), and had semi-regular attendance to museums and galleries (M = 9.77 yearly visits, SD = 18.42; see [53] for general comparison to studies on typical museum visitor populations). Importantly, when

considered across the full participant sample, ratings spanned the entire range of all provided scales from very low to high liking, knowledge and typical visits to the arts.

Procedure

For all artworks and participants, we followed a procedure developed over the last 15 years of empirical museum studies to maximally balance ecological validity and experimental control[37,53,149]. This procedure aimed, as much as possible, to isolate a single-artwork or artwork set for the viewing experience, while maintaining (and not disturbing) the physical and social context of the museum. This aim is furthered by recruiting spontaneously in the gallery (as opposed to recruiting students or other individuals in advance and bringing them into the museum).

Visitors were approached, in most cases, in advance of entering a gallery/exhibition space. A member of the research team asked if they would be interested in participating in a study about art experience. If so, they were instructed to view a specific artwork which was pointed out by the researcher. Participants were instructed to enter the gallery space and view the artwork however they usually would while visiting a museum and for however long they liked. They completed their art experience unobserved by the research team. Upon feeling their experience was 'complete,' they were asked to return to the researchers to complete the post-viewing questionnaire.

In select cases (i.e., Nikolic at the Venice Biennale, Taring Padi at Documenta15, Kiefer at the Palazzo Ducale), visitors were approached following their exit from a gallery or exhibition space without a pre-visit discussion. This method was used in cases where the target artwork was embedded within larger exhibitions or museum visits, making the entrance inaccessible to our team members, but also only when the target artwork or artwork set constituted the only stimulus in the viewing location (i.e., large-scale installations), thus allowing us to ensure that the target art was the only artwork visited. Participants who agreed

to participate in this post-only assessment paradigm—which has shown high consistency with pre-/post assessments at the level of reported experience[19]—completed the same post-viewing questionnaire measure.

Participants could opt to complete the survey on paper or on their smartphones via a QR code allowing them to access the online commercial survey software Qualtrics[150]. In both formats, the survey was available to participants in English or German; an Italian version was offered at the two data collection sites in Italy (see Supplementary Table 1). Translations were completed and checked by at least two native speakers, and, particularly for the list of phenomenal terms, aimed to capture the intention of the phrase (rather than a direct translation). When the survey was completed in a language other than English, the English phrasing of the 90 phenomenal items (see Measures below) was also included alongside the German/Italian translations; all other items were written only in the primary survey language.

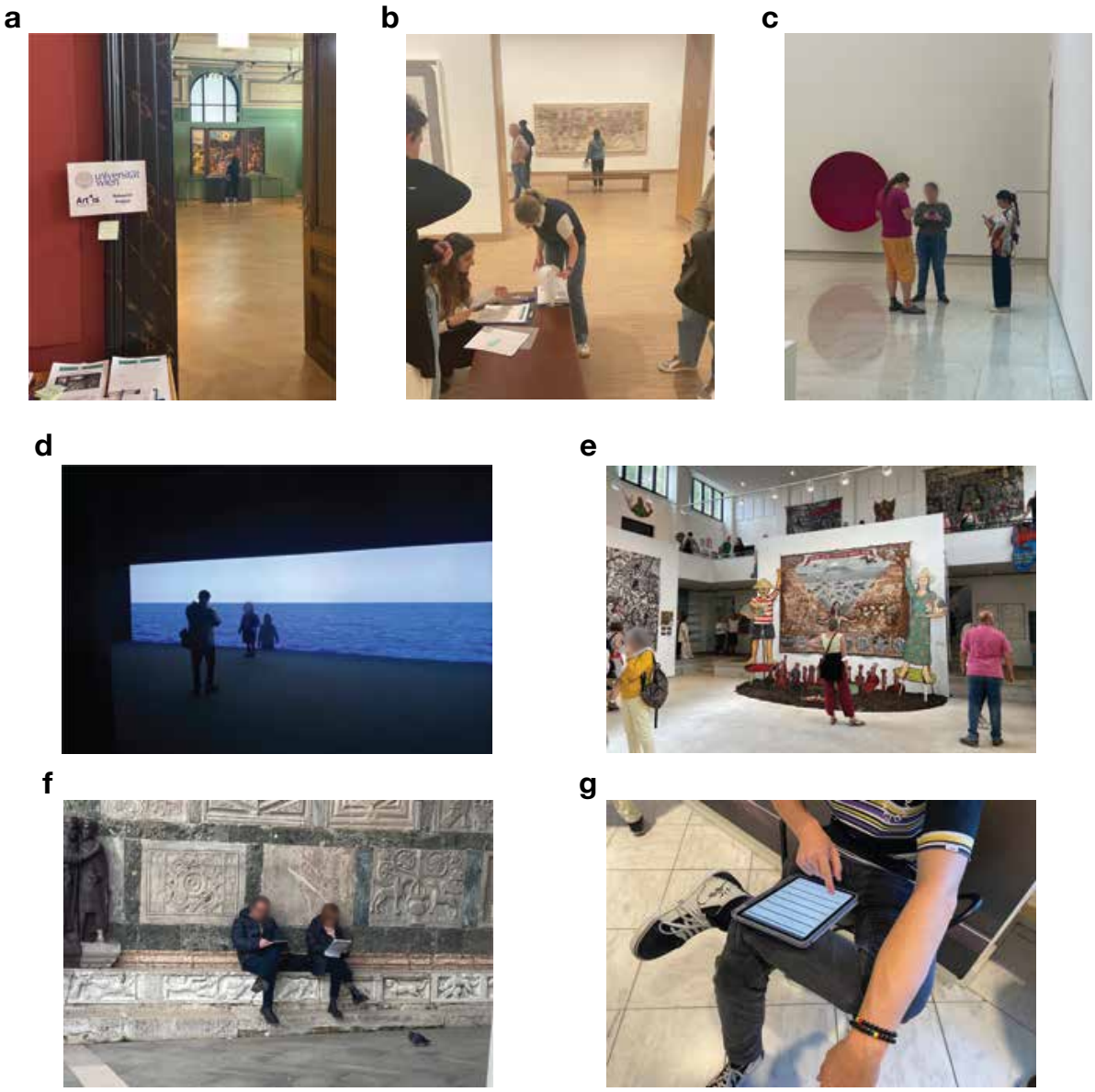

Fig. 6: Images documenting study procedure and museum environments. **a.** Study set up outside gallery room at the Academy of Fine Arts, Painting Gallery, Vienna, AT. **b.** Study set up with research assistants at the Albertina Modern, Vienna, AT. **c.** Research assistant approaching potential participants, Leopold Museum, Vienna, AT. **d.** Visitors photographing artwork in the Serbian Pavilion, 59th Venice Biennale, Venice, IT. **e.** Visitors engaging with installation artwork, Hallenbad Ost, Documenta 15, Kassel, DE. **f.** Participants completing post-viewing questionnaire after exiting exhibition space, Palazzo Ducale, Venice, IT. **g.** Participant completing post-viewing questionnaire outside exhibition space, Albertina Museum, Vienna, AT.

Materials

Stimuli

The final stimulus set included 31 artworks, selected from 11 institutions across five cities in four countries (Austria, Germany, Italy, United States). See Supplementary Table 1 for specific details on all artworks (including artwork title, artist, location, and by-artwork sample sizes). All were examples of visual art, including 22 paintings or other two-dimensional pieces (e.g. lithograph, woodcut, screenprint, mixed media) and nine sculptural/installation pieces.

Artworks were selected based on—in addition to general pragmatic factors of access/institutional partnership and testing accessibility (i.e. proximity of artwork to testing locations outside the target galleries)—maximizing variance across three factors expected to provide a range of artwork types and possible resulting experiences. These factors included: 'valence' (negative – positive), 'style' (mimetic/figurative – abstract), and 'meaning' (direct – conceptual). Similar descriptive axes have been used previously to assess the content and style of visual artworks and shown to influence both aesthetic ratings[83,151,152] and emotional responses[37,84,153]. While initial artwork selections were made by the consortium, the distribution of artwork characteristics was also assessed and verified by participant ratings (see Measures below).

Participant ratings of each artwork according to these three dimensions showed a good distribution across the entire rating space (see Supplementary Fig. 1 and Supplementary Table 4). Ratings also generally aligned with our pre-coding (Supplementary Table 1), supporting our aim for a comprehensive set of artworks that individuals might encounter in a typical gallery or museum.

Measures

The post-viewing questionnaire was designed to assess key participant factors as well as the art experience. Please note, not all included survey questions included are directly reported here (see Supplementary Table 9 for a full list of items).

Demographics, Artistic Background, and Interest. Participants first answered basic demographic questions (age, gender, nationality), two questions regarding their art interest and knowledge ('How much do you like art?', 'How knowledgeable are you about art?'; rated on Likert-type scales, from 0 = 'Not at all' to 10 = 'Very much'[37]), as well as approximately how many times per year they visit museums or galleries[37,149]. In the case of the Bosch artwork only, the demographics survey was used as a pre-viewing measure; as previous research has shown high consistency between pre-/post- and post-only assessments, this is not expected to affect results[19].

List of Phenomenal States. Participants then completed the main behavioural measure of their art experience, regarding the occurrence and intensity of various emotional and phenomenal states they potentially felt while engaging with the artwork. We aimed to incorporate a broad spectrum of experiences, possible feelings during art interactions or emotions felt in response to an artwork, while ensuring that all included items have some visceral sensation to them—i.e. they *feel like* something. Importantly, we also aimed to distinguish between felt and ascribed or depicted states[49,154,155]; we were less interested in if an artwork *was sad* than if it made a particular viewer *feel sad*. The final list of items incorporated a variety of emotional, cognitive, and phenomenal states which could potentially be felt or experienced during the course of one's meeting with an artwork.

The list of phenomenal states was developed collaboratively between an international consortium of members brought together under the mandate of a multi-year European Union Horizon 2020 funded project (https://cordis.europa.eu/project/id/870827/results) and including perspectives from empirical aesthetics, aesthetic philosophy, social and

phenomenal psychology, as well as experts in cultural policy management, art history, curation, and art education (for full list of contributing consortium members, see https://artis-h2020.eu/who-we-are). The present project was a central activity of this funding scheme, with the primary aim of providing an evidence-based foundation for understanding and quantifying the nature of visual art experiences at the individual viewer, single interaction level.

We compiled an initial list of over 200 possible items, pulling from foundational theoretical models[8] and empirical investigations of aesthetic experience from our team[37,91] and others[42,50–52,156]. We considered additional theoretical perspectives to identify groups of emotions/states that had been perhaps overlooked in or excluded from previous work. In particular, this drew attention to social emotions[157–159], embodied emotions[14,160,161], negative/neutral states[11,162], and knowledge emotions[163] all of which had been explored in theoretical discussion and, occasionally, targeted empirical assessments, but not often included in larger scale, experience-level assessments. In reducing this initial, extensive collection of possible items, we sought to retain a diverse set of distinct states, beginning with basic emotions, prototypical emotions in aesthetic experience (e.g., 'awe,' 'chills,' 'being moved,' 'pleasure,' 'wonder') and other items which were central to previous theoretical and empirical models (e.g., 'anxiety,' feeling 'like crying,' 'confusion,' 'epiphany,' 'novelty,' 'self-awareness,' 'serenity'). We then specifically incorporated a few items each from additional categories—social, embodied, epistemic, negative states—being mindful to reduce synonymic phrases (e.g., we included 'envy' and removed 'jealous'). See Supplementary Table 5 for a full list of items and references.

The final measure was comprised of 90 11-point unipolar, Likert-type scales (0, 1-10: 0 = 'Not at all'; answers from 1–10 corresponded to some incidence of a feeling as well as relative magnitude, with 10 = 'Very much so'[37,164,165]. An 11-point scale was chosen

according to recent suggestions that an 11-point scale is the minimum length discrete scale sufficiently able to be treated as continuous[165]. Participants responded to the prompt 'While viewing the artwork, I felt…' and reported the degree to which they felt each emotion or phenomenal state[37,91].

Two attention checks were embedded in the list of phenomenal items, in both paper and digital formats, and read 'On this line, please select 0' (or '10'). In the digital survey format, items were randomly divided into three blocks; by participant, the three blocks were presented in a randomized order and item order was randomized within each block. In the paper survey format, items were presented in a randomized order, which was then set for all paper forms.

Appraisals & Impacts. Participants were then asked to rate the artwork ('I thought the art was…') according to a series of 7-point bipolar, semantic differential scales[166], assessing liking, beauty, goodness, meaningfulness, complexity, and interest[19,149,167]. Participants also rated how they would describe their 'overall experience of the artwork,' from (1) 'very visceral and emotional' to (7) 'more detached and cognitive.'

Participants were then asked whether they would 'pay to see the artwork again,' 'recommend that a friend see this artwork' (7-point scale, 1 = 'Definitely not' to 7 = "Absolutely, I would'), 'how important (they) think the artwork is' (7-point scale, 1 = 'Not at all' to 7 = 'Very important'), and how profound this experience was 'in relation to all the arts experiences (they) have had' (7-point scale, 1 = 'Not at all profound' to 7 = 'the most profound of my life')[37].

The potential wellbeing and personal-growth related impacts of their art experience were assessed by three items (11-point scale, rated from 0 to 10); participants reported to what degree their experience made them feel worse/better, made them a worse/better person, and if it changed them in any way.

Finally, as a check of the stimulus diversity in our selection of artworks, participants rated the artworks on each of the axes used in our a priori classification, according to 'valence' (1 = 'positive' to 7 = 'negative'), 'style' (1 = 'mimetic/figurative' to 7 = 'abstract'), and 'meaning' (1 = 'direct [it is what it seems]' to 7 = 'conceptual').

Analysis

Unique Variable Analysis

Before constructing the network model, we performed a Unique Variable Analysis (UVA) with Spearman correlations and *glasso* construction[168,169], which examines inter-item correlations, to identify and reduce possible redundant variables. Given the intentions to use individual item scores in further analyses, we opted to remove one item from each of the identified redundant pairs, rather than create sum, mean, or latent scores. Item removal and retention decisions were guided by statistical and theoretical considerations (including inclusion in previous network studies, previous empirical research, and theoretical perspectives).

At standard significant coefficient thresholds of 0.25 and 0.2, no redundant pairs were identified, however, at a conservative threshold (0.15[168]), nine redundant pairs were identified. One item of each pair was removed (see Supplementary Table 6 for a full list of identified pairs and retained/reduced items). Following removals, no variable pairs had a weighted topological overlap (wTO) greater than 0.20 (threshold for small-to-moderate redundancy[169,170]). The reduced 81-variable dataset was then used for all subsequent analyses.

Network Construction, Communities, and Core Items

Hierarchical exploratory graph analysis (EGA[49,73]) was applied to examine the dimensionality of the list of phenomenal states, examine inter-item correlations, and identify 'core items.' Given the very low incidence of missing values (<0.8% for all variables; by participant missing item rates ranged from 0 to 9, out of 81, M = 0.213, SD = 0.847) and the

ability of the following analyses to accommodate some missing values[70,171], no imputation method was applied during the analysis. Analyses were conducted in *R* with the EGAnet[70] and NetworkToolbox[72] packages.

The network presented in Fig. 2 was produced via a *glasso* network construction method with Spearman rank-order correlations[69,70,74–76]. The *glasso* method produces a sparse network of partial correlations from the inverse covariance matrix; sparsity is ensured by the application of a lasso regularization procedure, which penalizes and shrinks small coefficients to zero (controlled by lambda parameter, the final value for which is determined by the algorithm to maximize EBIC[76]). To identify communities, the *louvain* detection algorithm[77–79] was applied iteratively with consensus clustering (1000 iterations[70]). In this algorithm, every node in the network is initially assigned to its own community, then each is iteratively added to the community of surrounding nodes. Nodes are ultimately assigned to the community in which its contribution to network modularity (i.e. strength of network divisions) is maximized, resulting in a stable, reproducible community structure[77]. Network fit indices are reported in Supplementary Table 7.

Hierarchical EGA further produces a higher-order network of the lower-order communities. Within each lower-order community, individual nodes are merged into an aggregate community-level node. The higher-order output then presents a network of these aggregate nodes, more succinctly explaining the relationship between the communities themselves. This was produced with the same construction methods as the primary, lower-order network. The higher-order network is not discussed in detail in the present paper, as it was obtained for further network stability and validation analyses which are outside the scope of the present paper.

Independent of community, centrality metrics are calculated for each individual node, to assess their position within and influence on the full network. Specifically, we examined

hybrid centrality, which combines measures of node strength, betweenness, and closeness[172–174]. To reduce the list of 81 states, items were ranked, within each of the ten identified lower-order communities, by hybrid centrality value. Items were specifically ranked and selected within communities in order to maintain the proportionality of each community within the full network. The top 20% of items per community (minimum one item) were retained as 'core' and used for the following analysis[37,91]. Hybrid centrality values for all items are reported in Supplementary Table 5.

Latent Profile Analysis

We next performed a latent profile analysis (LPA) in Mplus 8[71,80,175] to investigate shared patterns in participant responses across the retained 'core' phenomenal items and identify varieties of art experience[37,91]. LPA uses standardized scores and equalized variances to group participants based on underlying commonalities and shared response patterns, identifying a specified number of discrete response profiles. The analysis is repeated with different inputs (i.e. given numbers of profiles), then solutions are compared according to statistical fit indices.

For the present study, we conducted the LPA for two- to seven-profile solutions; fit indices suggested further consideration of the four- and five-profile solutions (see Supplementary Table 8 for detailed indices of each model). Examination of both reveal three similar profiles (neutral/disengaged, low arousal positive, and high arousal positive). In the four-profile solution, the fourth was a negatively-valanced profile. In the five-profile solution, this 'negative' group was divided into two distinct profiles with high negative-affect ratings: one which was simply negative, and a second in which negative affect was reported alongside prototypical aesthetic states (i.e. feeling moved, insight, transformed). Both solutions show high model fit (LL, AIC/BIC, etc.[80,176,177]), good entropy (>0.8[80,178,179]), and high confidence in individual profile assignments (average latent class posterior probability

>0.9[80,81]). Given the unique and conceptually-relevant character of the fifth profile, comparable fit according to quantitative indices, and following previous theoretical and empirical work[8,37], the five-profile model was selected for further analysis.

Auxiliary Analyses

Auxiliary analyses were also performed in Mplus 8 to relate the identified profiles to aesthetic ratings or other responses to the art engagement[37]. These analyses are comparable to a Wald Test of Mean Equality or a one-way ANOVA in that they identify group-level differences in means of additional variables not directly included in the LPA[71,180–182].

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3. Extensions and Applications.

To this point, I have presented the theoretical and methodological foundation of the primary dissertation work, as well as substantive empirical findings that identified five distinct profiles of phenomenal art experience. This next chapter presents additional projects which extend and demonstrate the various applications of the framework provided by the Experience Types identified in Miller et al. (2025 [2.2]). I demonstrate the applications of this approach at three levels: in the assessment of individual viewer characteristics, as input features that shape an experience [3.1], in the consideration of potential wellbeing and transformative impacts, or outputs, of an experience [3.2], and in its application as a tool utilized to investigate further research questions [3.3].

3.1 presents preliminary findings of an ongoing study based on additional data collected alongside those which were presented in Miller et al. (2025 [2.2]). While this study involved a brief discussion of artwork-level differences in ExpType occurrence (as related also to ratings of valence, style, and meaning), little consideration was given to individual differences beyond basic demographics. So, in parallel to the primary data collection, we included various additional measures of viewer characteristics with select subsets of artworks, which allowed for deeper investigation of the potential individual differences between ExpType groups.

3.2 reflects on the theoretical foundation of the presented empirical work, in light of these results and ongoing discussions and developments in the broader research field. We explore the implications of findings from 2.1 and 2.2 in relation to the VIMAP (Pelowski et al., 2017b) and consider the application of the provided framework to applications of the arts to wellbeing and societal challenges.

3.3 introduces two additional projects conducted during the course of my PhD, each of which applies this ExpType framework to new research questions. I first report on a study which integrated this measure with mobile functional near-infrared spectroscopy to investigate the neural correlates of art experiences in the museum [3.3.1]. The second study examines contextual effects, by directly comparing reported experiences of genuine artworks in the museum to experiences of digital replicas of the same artworks in the

laboratory [3.3.2]. Both studies utilized the list of 16 ‘core’ phenomenal states from Miller et al. (2025 [2.2]) as a standalone behavioral measure of art experience to match new participant reports, via confirmatory latent profile analysis, to the identified profiles. These projects demonstrate the utility and value of the identified Experience Types in future investigations throughout the field of empirical aesthetics.

3.1. Individual Differences.

As discussed up until this point, experiences with art are widely regarded to be deeply complex and nuanced. It has been well established, anecdotally and empirically, that there is wide interpersonal variance in reported responses to and experiences of art (Jacobsen, 2010; Leder & Nadal, 2014; Pelowski et al., 2017a; Pelowski et al., 2017b; Silvia & Nusbaum, 2011; Williams et al., 2023). Across populations, individuals express a variety of preferences for certain styles or artists, liking of specific artworks, as well a range of general liking of or interest in the arts at all. High variance also appears within one person, as an individual’s preferences or responses may change between instances and over time (e.g., Brielmann et al., 2023). An artwork may bore someone one day, and that same artwork may thrill them the next.

These complicated experiences with the arts do not occur in a vacuum, meaning they are not soley shaped by the artwork itself (for review, see Pelowski & Specker, 2022). Specific encounters are greatly affected by other experiential features and contextual factors, including setting, presentation, provided background information, and more (Anglada-Tort et al., 2018; Darda & Chatterjee, 2023; Gerger & Leder, 2015; Grüner et al., 2019; Pelowski, 2012; L. F. Smith et al., 2017; Specker, Fekete, et al., 2021a). Beyond the external or stimulus features, one’s experience of an artwork is hugely influenced by their own self and what they themselves bring to the encounter. Previous work has studied the influence of individual characteristics—including personality, expertise (Brida et al., 2016; Darda & Cross, 2022; Dehghani Tafti et al., 2025; Else et al., 2015; Feist & Brady, 2004; S. P. Joy, 2008; Mastandrea et al., 2019; Silvia et al., 2015; Silvia & Nusbaum, 2011; Swami & Furnham, 2014; Williams et al., 2023)—by connecting these to variance in liking, appreciation, preferences, habits, emotional response, and specific impacts of engagement, but rarely consider associations with holistic phenomenal experience.

The Experience Types presented in Miller et al. (2025 [2.2]) offer a unique framework for studying the role of individual differences in shaping global art experience. We have shown the character of the profiles themselves to be stable across and independent of specific contextual and primary individual features (artwork, setting, basic demographics); as these features change however, the probability that a specific ExpType is reported changes. The specific ExpType possibilities are consistent, but which experience a certain individual reports with a certain artwork would, in concept, be dependent on their personal characteristics, the artwork, the setting, and any number of other independent or situational features.

In Miller et al. (2025 [2.2]), we briefly assessed group-level differences in basic participant demographics, finding that age, general liking, general knowledge, and rate of museum attendance varied across ExpType groups. Those who had Novel, Harmonious, or Transformative experiences, on average, reported higher levels of general liking and knowledge of art and more regular attendance to museums or galleries. The Disengaged and Negative groups showed the lower average levels of general liking and knowledge, as well as less regular attendance; the Disenaged group was, on average, the oldest, while the Negative group was the youngest. Gender showed no relationship to ExpType.

This report presents preliminary results of this study, which aims to dive deeper into the role of personal characteristics and individual differences in shaping the types of experience a museum visitor may have with a particular artwork. Alongside the primary collection of self-reported phenomenal experience, appraisals, and impact measures (Miller et al., 2025 [2.2]), we collected additional measures of individual differences with two sets of 11 artworks and assessed differences in reported chatracteristics between ExpType groups. Specifically we looked at individual characteristics commonly discussed within aesthetics research, including Big-Five personality, aesthetic responsiveness, visit motivations and expectations. We further assessed others, which have not been directly investigated previously but have been suggested as relevant to our engagements with art, including political ideation, personal values, and emotion regulation and differentiation.

Miller, S. L., Pelowski, M. (2025). *Individual difference factors shaping art experience types.* [Manuscript in preparation].

Contributions:

I conceptualized of this study, coordinated and managed data collection alongside that for Miller et al. (2025 [2.2]), under the supervision of MP. I conducted the data analysis and am drafting the initial manuscript. MP will provide feedback in advance of submitting the manuscript for publication.

Methods and Materials.

Participants.

The study included a total of 1,866 individuals, between the two groups (N_{Group1} = 1,023 and N_{Group2} = 843). This sample was reduced from an initial 1,946 in Miller et al. (2025) who responded to one of the 22 artworks included in the present study; 60 participants were excluded (40 from Group 1; 20 from Group 2) because they did not complete any of the additional individual difference measures. All participants viewed only one artwork, of the 11 included in each study (Group 1: $M_{artwork}$ = 93.0, *SD* = 10.29, range = 76-111; Group 2: $M_{artwork}$ = 76.6, *SD* = 18.12, range = 44-99) and were convenience sampled from the regular visitors of our target institutions.

The final sample for Group 1 included *N* = 1023 participants (58.7% female, 1.7% nonbinary/other; M_{age} = 33.48, *SD* = 14.74, range = 18-85; 78 nationalities). Participants reported relatively high general liking of art (*M* = 8.13, *SD* = 1.63) and moderate art knowledge (*M* = 4.90, *SD* = 2.08), as well as semi-regular visits to museums or galleries (*M* = 7.37, *SD* = 14.64, range = 0-365). Group 2 ultimately included *N* = 843 individuals (57.8% female, 1.5% nonbinary/other; M_{age} = 38.16, *SD* = 16.50, range = 18-78; 77 nationalities). Like Group 1, participants again reported relatively high general liking of art (*M* = 8.15, *SD* = 1.75), moderate art knowledge (*M* = 5.07, *SD* = 2.06), and semi-regular visits to museums or galleries (*M* = 9.21, *SD* = 12.9, range = 0-213). The two sample populations are well aligned with each other and the original sample of Miller et al. (2025), as well as the usual demographic profile of museum studies (Hanquinet, 2013; Pelowski et al., 2017a; Tinio et al., 2014).

Procedure.

At all sites and with all artworks, we followed a common procedure in museum studies developed to best isolate the viewing experience to a single artwork while balancing ecological validity and experimental control (Miller et al., 2024, 2025; Pelowski et al., 2024; Pelowski et al., 2017a). Museum visitors were approached before they entered the gallery room containing the target artwork and asked if the would be interested in participating in a study about art experience. Upon agreeing to take part, participants were directed to the target artwork, instructed to view the artwork how they usually would and for however long their like, and completed their viewing experience unobserved by the research team. When they felt their experience was 'finished,' they returned to the researchers to complete the post-viewing questionnaire. See Miller et al. (2025) for further discussion.

Materials.

Stimuli. The full stimulus set included 22 artworks from four internationally-renowned museums in Vienna, Austria, which were divided in two sets of 11. All artworks in the first artwork set were on view at the Albertina Museum; two artworks were shown as part of temporary exhibitions, while the other nine belonged to their permanent collection[7]. The second set of artworks included pieces from four museums in Vienna: three from the Albertina, four from the Albertina Modern, three from the Belvedere Museum and one from the Leopold Museum. Two artworks from the Belvedere and the one from the Leopold were part of permanent exhibiitons, while the eight others were shown as part fo temporary exhibitions at the respective institutions. All 22 artworks were examples of visual art, including 20 paintings or other two-dimensional pieces (e.g., lithograph, woodcut, screenprint, mixed media) and two sculptural pieces. See Miller et al. (2025) for detailed discussion of artwork selection criteria for the initial study.

Measures. The post-viewing questionnaire was completed by all participants, across all sites and artworks, and assessed key aspects of participant experience—

[7] See Supplementary Table 1 of Miller et al. (2025) for details on all artworks. Set 1 included: Albert, Basquiat, Delaunay, Kupka, Magritte, Marc, Miro, Monet, Muntean-Rosenblum, Picasso, Renior. Set 2 included: Faust, Kapoor, Katz, Kollwitz, Nitsch, Rego, Schönn, Smith, Troger, Turrell, Warhol.

including responses to a list of 90 phenomenal states, common aesthetic evaluations (e.g., liking, beauty, meaningfulness), behavioural implications (e.g., willingness to pay to see the artwork again, likelihood of recommending to a friend), and wellbeing impacts (e.g., whather they felt better, whether they felt changed). A full list of items, as well as analysis and discussion of these measures, is presented in Miller et al. (2025).

For the present study, additional personality and individual difference measures were included at the end of the base questionnaire. In consideration of survey length and participant fatigue (Bitgood, 2006), additional measures of interest were divided into two sets, each of which was used during data collection with one set of 11 artworks.

Additional Measures Set 1. Group 1 completed additional assessments of Big-Five personality, trait aesthetic responsiveness, socio-political attitudes, and experienced immersion.

Trait aesthetic responsiveness was assessed via the Aesthetic Responsiveness Assessment (AReA; Schlotz et al., 2021). This scale has 14 items and is comprised of three subscales: aesthetic appreciation (eight), intense aesthetic experience (four), and creative behavior (three). Items assess how often participants engage in certain behaviours or experience specific responses, rated on a 5-point scale (0 = 'Never' to 4 = 'Very often').

Personality was assessed via the BFI-2-XS, which includes 15 items rated on a 5-point scale (1 = 'Disagree strongly' to 5 = 'Agree strongly'; Soto & John, 2017a, 2017b). Three items each are used to assess five subscales: extraversion, agreeableness, conscientiousness, negative emotionality, and open-mindedness.

Participants' (political) ideologies were assessed via four bespoke items. Participants were asked how they would describe both their fiscal and social political values, providing ratings on a 7-point scale (1 = 'Very conservative' to 7 = 'Very liberal'). Religiosity and spirituality were also assessed on two 7-point scales (1 = 'Not at all religious/spiritual' to 7 = 'Extremely religious/spiritual').

Immersion was assessed by five items: the first was a broad assessment of "how immersed were in (their) experience of the artwork" (Cotter et al., 2022, 2024) An additional four items assessed specific factors of immersion—captivation, real-world disassociation, comprehension, and transportation—derived from previous work on

immersion in video games (Jennett et al., 2008) and an adapted approach to experiences of immersion in film (Rigby et al., 2019). The film measure included 24 items; the top loading item from each of the four factors was used here. All five items were rated on a 11-point scale (0 = 'Not at all' to 10 = 'Very much so'). While immersion is not a typical measure of 'individual differences,' it was included as a proposed mechanism by which more profound experiential states may occur (Cotter et al., 2024) and which may be associated with trait-level tendencies (Rózsa et al., 2022; Witmer & Singer, 1998).

Additional Measures Set 2. Group 2 completed measures which assessed their motivations for visiting the museum, expectations of their visit, personal values, as well as their emotional capacities in terms of regulation strategies and complexity.

Participants reported on their expectations of and motivations behind their museum visit. They were first asked specifically what their expectations of their visit *today* were by indicating which of the eight given categorical responses best fit their current visit (e.g., 'to learn something,' 'to be able to say that I have been to this museum,' 'to see one particular artwork'; Mastandrea et al., 2007). General motivations were assessed by ratings of the extent to which each of 12 items applies to why they *usually* visit museums or galleries (7-point scale, 1 = 'Not at all' to 7 = 'Very much so'; e.g., 'have my thoughts provoked,' 'experience the beauty of artworks,' 'have a nice time with family/friends'; Tröndle et al., 2014).

Personal values were assessed by 16 items categorized into hedonic, egoistic, altruistic, and biospheric factors (de Groot & Steg, 2008; Steg et al., 2014). Participants rated the importance of each value as guiding principles in their life on 9-point scale (where -1 = 'this is opposed to my values', and 0 = 'not at all important' to 7 'extremely important).

Emotional capacities were assessed via two measures. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) assesses participants use of two emotional regulation strategies: suppression and reappraisal (four and six items, respectively, rated on a 7-point scale; 1 = 'strongly disagree' to 7 = 'strongly agree'). The Range and Differentiation of Emotional Experience Scale (RDEES; Kang & Shaver, 2004) measures

experienced emotional complexity: range and differentiation (seven items each, rated on a 7-point scale; 1 = does not describe me very well' to 7 = 'describes me very well').

Participants could complete the survey on paper or on their smartphones via a QR code allowing them to access Qualtrics (*Qualtrics*, n.d.). The survey was further available in both English and German. Validated German versions of included measures were used when available (AreA, Schlotz et al., 2021; BFI-2-XS, Rammstedt et al., 2020; ERQ, Abler & Kessler, 2009; personal values, Schwartz, 2021). Other measures were translated and checked by at least two native German speakers.

Analysis.

Measures with subscale structures were scored as necessary, by the calculation of mean scores across subscale items (with specific items reverse scored as indicated by the original publication). For the AreA, both total (15 items) and subscale scores (aesthetic appreciation, eight items; intense aesthetic experience, four items; creative behaviour, three items) were calculated. For the BFI-2-XS, five factor scores were calculated (three items each for extraversion, agreeableness, conscientiousness, negative emotionality, and open-mindedness). Personal values were scored by four dimensions (hedonic, three items; egoistic, five items; altruistic, four items; biospheric, four items). Two factor scores each were calculated for the ERQ (reappraisal, six items; suppression, four items) and the RDEES (seven items each for range and differentiation subscales).

No scoring was necessary for measures of political ideation, immersion, visit motivations, or expectations. Note though that for visit expectations, response counts of two items ("to see one artwork in particular" and "to see one particular exhibit") were combined given their low independent response rates and significant conceptual overlap. Participants who indicted multiple responses (n = 29) were excluded for analysis of this question[8].

The influence of individual difference measures on art experience was assessed by evaluating potential differences between groups of participants who were identified—through network modelling and latent profile analysis—as reporting the same variety of

[8] The sole exception being the one participant who indicted both "to see one artwork in particular" and "to see one particular exhibit," and only indicated these two items. Their response was counted in the combined total.

phenomenal art experience (Miller et al., 2025). From *N* = 2747 reports of phenomenal experiences collected across 31 artworks, a network model of phenomenal experience was constructed that described the broad structure of these experiences, visualized the connections between specific nodes (i.e., phenomenal states), and defined three higher-order communities within the network. A set of 16 'core' states were selected, based on hybrid centrality (an index which quantifies the position and influence of a specific node on those around them and the overall network), and used in a subsequent latent profile analysis (LPA) to invetigate potentially shared response patterns. The analysis indicated a five-profile solution, with each profile representing a distinct type of experience, and each participant was, according to their phenomenal report, assigned to one of the five profile groups: Harmonious, Novel, Transformative, Disengaged, Negative.

To assess group-level differences in individual difference characteristics between Experience Type groups, a series of one-way ANOVAs were conducted. For the occasional categorical respnse (i.e., visit expectations), a chi-squared test was performed. As a point of comparison to the strenght of potential effects, we also conducted chi-squared tests between Experience Type and artwork.

Preliminary Results and Discussion.

Descriptive statistics for all measures are presented in Appendix 1 Table 1A/B (Group 1) and Appendix 1 Table 2 A/B (Group 2), for the full sample, as well as broken down by artwork and by experience type. Results of one-way ANOVAs for differences in individual characteristic variables by ExpType are reported in Appendix 1 Table 3 (Group 1 results) and Appendix 1 Table 4 (Group 2 results).

Group 1.

For Group 1, all scores of Aesthetic Responsiveness (total and three subscores) showed significant differences between the ExpType groups (A1 Table 3). Pairwise comparisons show that those who reported Novel or Transformative, followed by Negative, experiences tended to score higher than others (Fig. 1). The subscale of intense aesthetic experience showed the largest effect ($\eta^2 = 0.10$), where following the Transformative and Novel groups (with means of 2.24 and 2.16, out of 4, respectively),

those who reported Negative (*M* = 1.87) and Harmonious experiences (*M* = 1.65) scored next highest; the Disengaged group scored the lowest (*M* = 1.45).

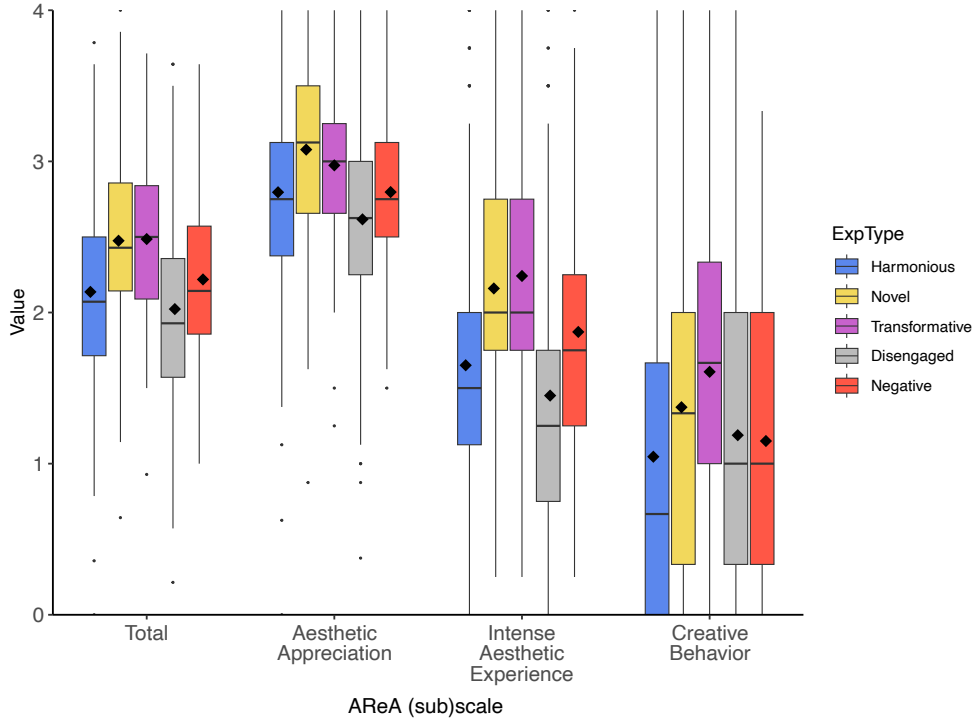

Fig. 1. Participant scores on Aesthetic Responsiveness between Experience Type groups. Results are shown for the total score and each of the three subscales. All scores showed significant differences across ExpTypes. Specific results of pairwise comparisons are reported in A1 Table 3.

We also found significant differences between the ExpType groups in reported agreeableness, religiosity and spirituality, though all with small effect sizes ($\eta^2 \leq 0.2$). For agreeableness, pairwise comparisons showed no difference between the Novel (*M* = 3.89, out of 5), Harmonious (*M* = 3.77), and Transformative groups (*M* = 3.67); the Negative group (*M* = 3.61) scored significantly lower than the Novel, while the Disengaged group (*M* = 3.58) scored significantly lower than the Novel and Harmonious groups (A1 Table 3). In ratings of both religiosity and spirituality, Transformative and Novel groups showed the highest ratings. In religiosity, the Harmonious and Negative groups followed with similar moderate ratings, with the Disengaged group showing the lowest average rating. For spirituality, the Harmonious group showed the lowest ratings, while Negative and Disengaged groups

reported similarly moderate levels. All group-level means are reported in A1 Table 1B and pairwise comparisons are reported in A1 Table 3.

Ratings of immersion showed significant differences across ExpType groups for four of five items: general immersion, and items for captivation, comprehension, and transportation. The effect of comprehension showed a small effect size ($\eta^2 = 0.03$); others showed large effects ($\eta^2 = 0.21$-0.25). In general, the Novel group reported the highest levels of immersion, followed by the Transformative and Harmonious groups, while the Disengaged group consistently reported the lowest levels (A1 Table 1B, A1 Table 3).

All observed effects of variables assessed in Group 1 remained significant after correction for multiple comparisons ($p = 0.05/18 = 0.0028$).

Group 2.

Significant group differences were detected in a number of participant ratings of why the usually attend museums. Some motives that varied between ExpType groups included to 'have my thoughts provoked,' 'be a part of the art exhibitions with all my senses,' 'experience deep connection to art' and 'experience the beauty of artworks'. Pairwise comparisons for all significant variables are reported in A1 Table 4; generally, groupwise differences were most often found between Disengaged and other experiences, as well as Harmonious and other experiences. A chi-squared test of the categorical selections of current visit expectations did not show a significant associated with ExpType ($\chi^2_{40} = 27.505$, $p = 0.2815$).

There was also a significant difference in emotion suppression scores between the ExpType groups (A1 Table 4). Pairwise comparisons showed that those who reported Transformative experiences also indicated higher levels of emotional suppression than those who reported Harmonious, Disengaged, and Negative experiences.

A handful of other variables (including two motivations, egoistic and biospheric values, emotional reappraisal, range, and differentiation) initially showed small significant effects, but these did not remain significant following correction for multiple comparisons ($p = 0.05/20 = 0.0025$).

Discussion.

Preliminary results show some significant differences in individual viewer characteristics between ExpType groups, with the largest effects seen in ratings of immersion ($\eta^2 = 0.21\text{-}0.25$) and aesthetic responsiveness ($\eta^2 = 0.07\text{-}0.10$). Other factors, such as, agreeableness, religiosity, spirituality, visit motivations, and emotional suppression were also significant, but with low effect sizes ($\eta^2 \leq 0.05$).

Findings of significant variance in aesthetic responsiveness demonstrate the relevance and impact of viewer characteristics on art experience, specifically suggesting key differences in the sensitivity of individuals to these experiences (Schlotz et al., 2021), as well as their approach to or motivations for the museum visit (Brida et al., 2016; Mastandrea et al., 2007). It is also important to note that the Negative group scored the highest, following Novel and Transformative ExpType groups, for the total AReA score and the aesthetic appreciation and intense aesthetic experiences subscales. This finding, taking in consideration with previous findings from Miller et al. (2025) that Negative experiences were often associated with relatively high ratings of meaningfulness—particularly compared to Disengaged experiences—provides more insight into what determines if someone, who is likely to have a less positive experience, might end up having a Negative or Disengaged one. Specifically, higher AReA scores suggests that individual predispositions may contribute to this determination.

At the same time, the lack of significant group differences on any subscales (except agreeableness with a small effect) was surprising, particularly for open-mindedness, given previous indications of the importance of openness to experience (Fayn et al., 2015; Feist & Brady, 2004; McCrae, 2007; Silvia et al., 2015). Looking to the descriptive data, we see relatively high mean scores for open-mindedness for the overall population, in addition to for each ExpType group. This may suggest a self-selection bias in museum visitors, especially those that agree to spontaneously participant in a research study during their visit; these individuals may be predisposed to these behaviours due to high openness to begin with (Aluja et al., 2003; Rawlings et al., 2000; Schlotz et al., 2021).

Immersion may not a typical measure of individual differences, but the tendency to become immersed has been suggested as a relatively stable trait-level characteristic

(Rózsa et al., 2022; Witmer & Singer, 1998). While the questions included in the present study were specific to the immediate experience, observed group-wise differences in reported facets of immersion suggests different forms or mechanisms of engagement across ExpType groups. Results may indicate varying experiences of immersion due to the emotional and cognitive progression of each ExpType; they may also indicate a predisposition or willingness to become immersed in their experiences. Future studies should work to disentangle these potentialities.

As a point of comparison on effect sizes, we conducted a chi-squared analysis to compare the distribution of ExpTypes across artworks in both groups. Analyses revealed—as expected based on original results from Miller et al. (2025)—significant and large effects of artwork on ExpType distribution for both Group 1 ($\chi^2_{40} = 237.48$, $p < 0.001$, Cramer's $V = 0.241$) and Group 2 ($\chi^2_{40} = 207.38$, $p < 0.001$, Cramer's $V = 0.248$). As individual characteristics have previously been shown to interact with artwork style in affecting judgement ratings and experience (Darda & Cross, 2022; Else et al., 2015; Feist & Brady, 2004; Swami & Furnham, 2014; Williams et al., 2023), it may be that the large effect of artwork, especially in comparison to small effect sizes observed for individual viewer-characteristic variables, may be obscuring potential effects of characteristics.

We plan to explore additional analyses that allow us to account for the inherent variance between the artworks and assess potential interactions between artwork and viewer characteristics in predicting ExpType. Specifically, we will look at applying multinomial logistic regressions, which are used to predict categorical group membership based on categorical and/or continuous predictors. Also, up until this point, we have only looked at each viewer characteristic individually; we will also explore multi-level models that enable us to examine the potential cumulative effects and interactions between individual personality and individual difference factors.

3.2. Wellbeing and Societal Challenges.

The following publication constitutes a return to the theoretical foundation of the empirical approach presented in 2.1 and 2.2 (Pelowski et al., 2017b), reflecting on the VIMAP in light of both recent empirical findings (Miller et al., 2024 [2.1], 2025 [2.2]) and broader attentional shifts in the field of empirical aesthetics to questions surrounding the personal and societal implications of arts engagement. We consider the value of such an outcome-oriented framework in studying the application of the arts to health and wellbeing, as well as social challenges and transformation, and highlight the importance of a theory- and data-driven approach to assessing experience in a holistic capacity that centers the lived, phenomenal experience of individuals, rather than one that replies on solely ratings of secondary evaluations (e.g., liking, valence). The proposed and identified Experience Types serve to describe experience in such a way that they can be connected to further implications, allowing them to be reframed as pathways to broader social and personal implications.

Pelowski, M., Cotter, K. N., **Miller, S. L.**, & Leder, H. (2025). Framing wellbeing and societal challenge mechanisms via distinct outcomes of art experience? A brief revisit to the VIMAP. *Physics of Life Reviews*, *52*, 132–143. https://doi.org/10.1016/j.plrev.2024.12.004

Contributions:

This paper arose from ongoing discussions among the author team. From these discussions, MP drafted the original manuscript. I, along with all other authors, provided comments and edits prior to submission.

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Framing wellbeing and societal challenge mechanisms via distinct outcomes of art experience? A brief revisit to the VIMAP

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ABSTRACT

In this brief contribution—happily afforded by the 20th anniversary of Physics of Life Reviews—we take the opportunity to reflect on our earlier published paper, which had introduced a theoretical framework, the VIMAP (Vienna Integrated Model of (Top-Down and Bottom-up processes in) Art Perception; (Pelowski et al., [1])) that has come to represent a major basis for organizing, anticipating, and empirically investigating the nuanced, multivariate visual art experience. We look back at the original model and its hypotheses, especially as these regard distinct "outcomes," which we had argued may provide a superstructure of supraordinate, shared varieties of art experience detected across individual meetings of viewer, context, and artworks. In the present paper we consider whether these outcomes could also be a useful tool for approaching new demands across multiple art-related areas that have strengthened in the years since the original publication regarding applying the arts to wellbeing, societal challenges, and health. All of which require a framework for better understanding and testing the nuanced features of individual-centered art experience. We briefly—and admitedly very speculatively—consider how these new topics could be fit to the VIMAP [2]. Guided also by new evidence from our team that has provided a bottom-up verification of the specified outcome types and their implications, we provide a working set of suggestions whereby we might connect wellbeing- or attitude/behavioral change-related targets to the specific VIMAP outcomes, which we argue may provide a powerful mechanistic structure for future research.

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1. Introduction

> *"Whether in education or in society at large, the belief is the same: 'the artistic experience can have transformative effects on both the individual and society.' The challenge at both levels is also the same: to explain exactly how"* (Gaztambide-Fernández, [3], p. 218, partially quoting [4], p. 226).

In 2017 we (MP and HL of the present paper) had the opportunity to publish a comprehensive theory of art processing in Physics of Life Reviews [1]. This project marked our attempt to synthesize what our own studies and multiple fields—art history, aesthetic philosophy, sociology and anthropology, and, largely, the burdgeoning area of empirical aesthetics and its psychologial/neurobiological investigations—had to say about the unique act of engaging with art.

We did this by directly targeting the very aspects that had been argued to make art so compelling, but also so difficult to consider—the very multiplicity and multivariate nature of the potentially infinite aspects of viewer, context, and art media, and the myriad emotional, cognitive, and neurophysiological responses that art might engender. We proposed a means of organization and, even more, distinct and specific outcomes. The resulting VIMAP—*the Vienna Integrated Model of (Top-Down and Bottom-up processes in) Art Perception*—has come to represent an important basis for several fields in their quest to meaningfully engage with and study the arts. It has been combined with assessment methods for investigating experience, employed in the lab and in the field, gallery, or museum, and has served as a theoretical framework for considering the implications and impacts of the arts.

At the same time, the following years have also seen impressive new advances for both theory and, even more, for application of the arts: tackling questions of whether and how a visit to a museum or an exhibition might be a vehicle for changing minds or behaviors, considering whether art engagements could ameliorate wellbeing or societal challenges; not to mention when this could be accomplished and what the underlying processes for such pragmatic applications might be? These topics represent a truly exciting time for scholarship, bridging even more fields than anticipated in the original VIMAP. They also contain many similar issues and demands that drove the original paper. This includes a similar mandate to explore the impacts of the arts, often in terms of emotional and physiological factors beyond mere appraisal and perception. Such a task requires nuanced discussions of mechanisms that can be fit into a

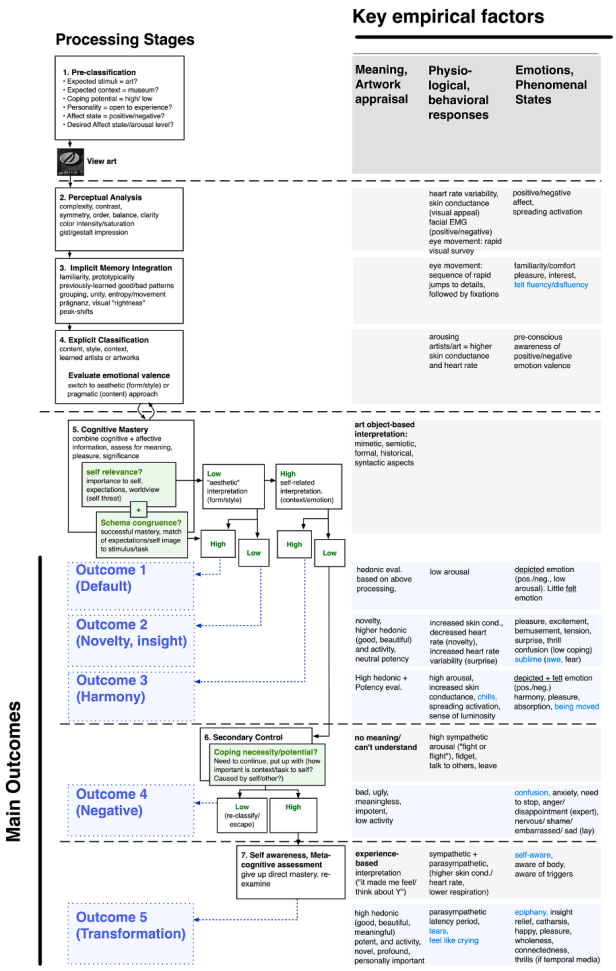

Fig. 1. The VIMAP model of art experience processing stages and distinct outcomes (left) and key empirical factors for delineating specific outcomes or stages (right). (originally published in [1]; Depicted model slightly revised version based on [6]).

broader theoretical framework, finding ways to incorporate the relevant contextual, inter-individual, and artwork-related factors into a meaningful organization so that we might apply and anticipate this. All of these research demands, we would argue, might be also compellingly connected to, or benefit from, the suggested processes and outcomes of the VIMAP or a similar integrated model.

Here, we take the opportunity to both reflect on the original model and, even more, to consider these new movements, especially these discussions of the application of the arts to wellbeing, societal challenges, as well as general developments across institutions towards more individual-centered experience. Guided by new empirical findings from our original authors' and, here, our new co-authors' teams for evidence of the suggested outcomes and their implications, we—very briefly and speculatively—consider how these could be fit to the VIMAP and its suggested outcomes. Although very much at the level of a thought experiment (representing, in fact, a glimpse of a major update for wellbeing and outcome mechanisms that we are currently devising), this paper might provide a set of working ideas for future applications of the model and for the ever-expanding interest in a nuanced and evidence-guided theoretical and pragmatic application of the arts.

2. A brief review of VIMAP and the theoretical organization of nuanced, multifaceted art experience

The original paper had, from the get-go, "a rather audacious purpose" ([1], p. 80). To quote from the abstract accompanying the paper, we had aimed to "present a comprehensive theory explaining, and further providing hypotheses for the empirical study of, the multiple ways by which people respond to art." We argued for the need of such an approach for various reasons. Primarily, this was because of a fascinating but also rather disheartening disconnect in art research, whereby "despite common agreement that interaction with art can be based on a compelling, and occasionally profound, psychological experience, the nature of these interactions is still under debate." Additionally, due to the complexity and variety surrounding the arts, which had accrued over centuries of discussion in philosophy, art history, and popular/anecdotal discourse, there were ever-present arguments that art studies and theoretical explanations would have to be so-overly controlled, focused on only one or a few basic elements, or even so overly complex and nuanced, so that these could not be organized and so-called 'real,' 'ecologically-valid' art experiences could not really be researched (e.g., [6,7] for reviews).

We therefore proposed our paper "with the goal of resolving the multifarious processes that can occur when we perceive and interact with visual art. Specifically, focus[ing] on the need to integrate bottom-up, artwork-derived processes, which have formed the bulk of previous theoretical and empirical assessments, with top-down mechanisms that can describe how individuals adapt or change within their processing experience, and thus how individuals may come to particularly moving, disturbing, transformative, as well as mundane, results" ([1], p. 80). The main desire was for the model to stand primarily as a basis for empirical research, with a focus on a pragmatic discussion of *how, why*, and *when* individuals might report different art-related responses, and with further emphasis on how these fit into the age-old and continuous commentary on the impacts that art might have, and thus how these processes—nuanced and multivariate as they are—might be theoretically explained and investigated.

The resulting model (see Fig. 1 for slight update from [6]) employed a box-and-arrow design and specified seven stages. These encompassed a pre-engagement state, defined by individuals' schema, expectations, and understanding of the world and their self, which itself was a new development at the time, explicitly adding this into a proposed model. This was followed by stages of, first, largely bottom-up processing of formal features of a stimuli/environment, grouping, classification, and top-down integration with individuals' memory or past experiences, culminating in an initial assignment of meaning, relative understanding, and (generally positive/negative) evaluative and affective response. These stages were then further coupled with secondary, viewer-centered processes in which an individual may respond to, modulate, or give further meaning to the experience, and culminating in a set of specific outcomes, including: (1) a generally neutral/facile outcome in which individuals have a short, shallow interaction, aligning to the most common response to art; (2) novelty/interest, tied to seeing something new or even surprise/learning; (3) a harmonious/resonant outcome, with intense positive emotion, deepened sense of meaning or self-relevance, aligning to discussions of absorbing, flow-like states; a (4) negative outcome, in which individuals have difficult or challenging reactions that may not be resolved; and finally (5) a transformative outcome where individuals may surpass initial challenge by reflection and adjustment.

Stages and outcomes were each also connected to specific factors (Fig. 1)—emotions, cognitive features of meaning-making, sympathetic or parasympathetic physiology, even hypotheses for brain activations—suggested to accompany and partially define specific outputs or each model stage. We also built in subsequent hypotheses, such as the potential that the experiences, stages, and outcomes could be further delineated, conceptually if not, at least to date, neurocognitively, by a three-part "check" of "congruency" (i.e., match of the conditions of a stimuli and environment to prior schema), "self-relevance" (or threat) (i.e., relatively how much would one care or be impacted by the outcome of an engagement?), and, eventually in some cases, by a relative need for "coping," reflected in the urge to physically or mentally 'walk away' or, alternatively, the capacity to stick out especially negative, challenges response (see e.g., [8] for earlier discussion in the context of art).

2.1. *Main implications—at the time of publication*

The model, we argued at the time, provided a number of new insights and potentialities for art research (see also [9] for further discussion and our replies to commentaries). This included the ability to make hypotheses for targeting complex art engagements, providing a necessary theoretical framework for anticipating and empirically testing various implications of encounters with art and allowing researchers to consider a truly wide range of factors in their assessment. These items were presented with the accompanying argument that by assessing these in empirical study—such as via physiological monitoring or behavioral scale-based reports from participants—researchers might not only capture key aspects related to art viewing but also identify and differentiate key patterns in

art experience.

Second, and theoretically connected to this above point, was our inclusion of the five outcome types. The selection of outcomes, we had argued, had been included to describe, in fact, *all* of the main possible ways that it might be possible to respond to art. Of course, this was not to say that each individual person's engagement was not highly nuanced and driven by context and the specifics of the artwork and individual. But, when conceptualized at a very basic psychological level, the outcomes and their characterization (e.g., the specific progressions and patterns) were suggested to be supraordinate, operating on a level that transcends the characteristics of the individual viewer and of the respective context of viewing. This was argued to best be thought of in terms of probability, with—given, again, a particular individual, context, and work of art—an expected likelihood of a certain type of response, varying across conditions.

The model itself, therefore, largely resembled an algorithm for explaining experience, where the phenomenological particulars of specific factors can be variable, but their relation and influence can be defined for study. Importantly, these outcomes and stages would also describe how different individuals, starting with the same artwork, could have different results (i.e., how can we describe and connect an experience that could be both emotionally profound, resonant, life-changing, or one that is boring and mundane). We argued this was theoretically necessary for any model that hoped to tackle the complex, and anecdotally rich, topic of how art does and does not impact us (consider the well-cited finding of average viewing times in major museums of around 10–30 s; [10]; see also several other examples in Fig. 2, modified from the original publication).

Although of course itself limited in many ways regarding what it could consider, through this conceptualization we hoped to

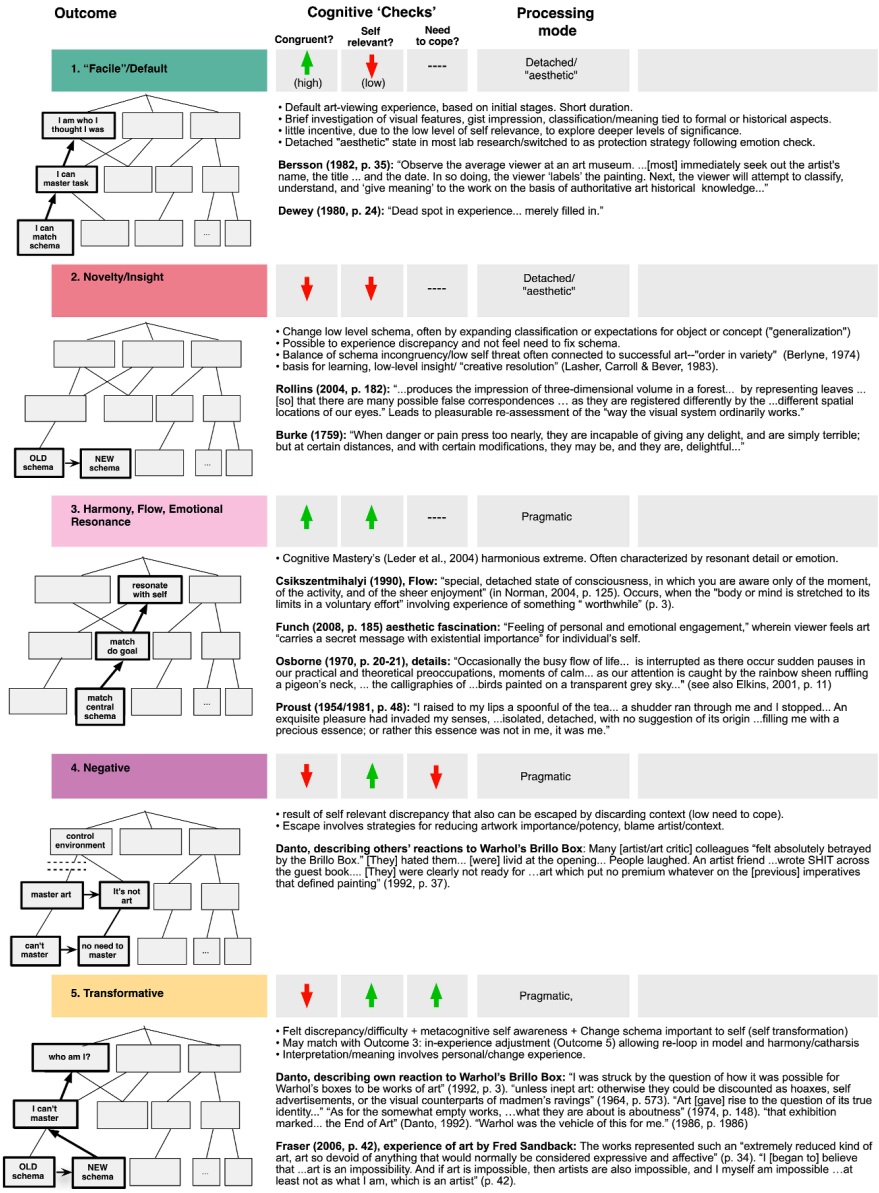

Fig. 2. Five main outcomes posited for processing art, corresponding congruency, self-relevance, and coping hypotheses, and examples from anecdotal discourse on arts. (slightly modified based on originally-published Figure in [1]).

provide a superstructure for tackling experience. To quote the famous, but also too easily forgotten aphorism of George E.P. Box [11]—"all models are wrong, but some [might be, we hoped,] useful".

2.2. Where we have come?—(Further) developments in discourse on the arts

Since the VIMAP was published, this approach has shown high promise in numerous studies at museums/galleries throughout the world (e.g., [6,12,13]). It has been connected to emerging theoretical discussions that, interestingly, might be fit nicely into the model, for example of predictive processing ([14]), which specifically center on aspects such as prior expectations or schema and how these might be applied to perception or even other aspects of experience, and which could suggest even neurobiological bases for many of the VIMAP components (e.g., [15], and earlier [16]; and most recently [17] for discussions relating specifically to the VIMAP). See also [18] for a look into the personal and theoretical context and our own scholarly journeys for our original interest in writing the model, as well as how we see it potentially serving as a tool for organizing art research.

But what of further developments? What has been recently happening across the arts? In fact, quite a lot:

2.3. Arts and health–(how) can an art engagement target wellbeing? Why?

A first major development is the discussion of applications of the arts for wellbeing and mental or physical health. This application—whether by engaging in directed arts-based therapies, visiting a museum, installing art in clinical or hospital settings, going to the theater, or even engaging art on the phone—has framed the arts as a potentially rich, adaptable source for intervention [19], which may especially be targeted for a range of individuals and outcomes. Galleries have started applying their collections [20], and practitioners have set up arts visits, to target mental restoration, improve mood, stress [21], loneliness [19,22] improve cognitive function [23], and described the potential of arts engagements to have widely-accessible, cost-effective, and non-pharmaceutical impacts [24]. Notably, a 2019 World Health Organization (WHO)-commissioned scoping review [25] reported over 3500 culture/arts activities connected with physical and mental well-being aspects.

Interventive arts are also a focus for new partnerships bridging researchers, institutions, and health systems—with emerging programs for social arts prescribing ([26–28]; see [29] for a recent review); new pathways from academia to institutions [30] and industry, and with the potential insights from this field promising implications spanning the humanities, architecture, urban planning, medicine, to basic psychology or neuroscience (see for example a recent paper exploring the potential of music for interpersonal relations in this journal, [31]). This is also matched by overt emphasis given to a broader range of targets [32]. For example, returning to the WHO, note that their definition of "health" (https://www.who.int/about/governance/constitution), beyond mere absence of ill feelings, specifies a "state of complete physical, mental and social well-being," and requiring a varied, adjusted mental and social existence, tailored to the individual. However, again, this also requires nuanced discussions of how these might all go together and whether, why, and under what circumstances, we actually might find such effects [33,34].

The very basis of current psychotherapeutic interventions requires targeting the cognitive and behavioral level of specific processes for engagement [35]. For example, in the arts and health arena, demands are being made for systematically-defined answers regarding “mechanisms” explaining the processes underlying well-being or other effects, as well as “active ingredients” ([36]; also [37])—what settings, expectations, cultural backgrounds, individual characteristics, or other mediating factors should be considered to maximize a particular result [38]. These need to be further fit into a broader theoretical framework and understanding of engagements beyond basic aspects such as liking or positive/negative valence (see e.g., [39] and [40]). Existing examinations of interventions have often lacked specific theoretical grounding about *why* a particular intervention would work or, even more, what to expect or to look for in arts engagements. This also coincides with the need to move from particulars and anecdotes or individual cases, although these can most definitely be a beginning and an end point, to a discussion of what is shared and unifying across experiences. A theoretical basis is required to develop systematic empirical investigation, testing a range of factors across persons and artworks.

Answers are also key for translating arts engagements into person-centered programs or targeting particular outcomes. It is clear that arts interactions and their potential impacts are not one-size-fits-all propositions. Art engagements may have certain benefits, in some cases, for some people [34]. Approaches also should be applicable to multiple settings, tracking engagements not only in the traditional museum but in the home, the clinic, the city, or workplace (e.g., [41]).

2.4. Social challenges–how might we change minds and behaviors via the arts?

Emerging discussions also involve art’s application as a vehicle to change actions or minds. Long suggested as a means of communicating ideas, values [42,43], or for education (see [4,44,45]), recent initiatives have specifically identified the arts as a means of directing or modifying behavior and thoughts (see e.g., [[12,46]]). In the form of directed exhibitions, collaborative projects, or specific installations and artworks, the arts are increasingly applied to target a range of contemporary social challenges, from shaping awareness and attitudes regarding immigration and refugees, to tackling responses to homelessness, clinical afflictions, or the climate (see [12,47–49] for reviews). These applications are also increasingly the specific foci of cultural organizations. See for example the recent Documenta fifteen (2022) or the theme—"foreigners everywhere”—of the 2024 Venice Biennale [76]. They are also the target of emerging policy and funding [50] and are a driving force behind the practice of many curators and working artists ([12] for review).

This set of questions is, of course, not new. Seeking cognitive change, learning, or development has been a long-desired pursuit for the arts (e.g., [51]), with more recent discussions of topics such as "aesthetic cognitivism" [52] or the capacity of arts to reveal new ways of perceiving or understanding. More generally, this goes hand-in-hand with desires to employ the arts for better social cohesion

or for shaping better-adjusted, empathic individuals through art experiences ([[12,13,53,54]]). Once again, these aims specifically call for an understanding of the processes that individuals might go through to arrive at such ends.

2.5. Thinking more broadly, in general, of how we might be framing or engaging arts

Often overlapping with the above demands, we have also seen a shifting focus from the very institutions and practitioners of the arts themselves, regarding the need for a revised and expanded admittance of a more open, nuanced, and multifaceted experience. In museology and curation, for example, the International Council of Museums (https://icom.museum/en/resources/standards-guidelines/museum-definition/) definition of a 'museum' has shifted from an emphasis more on an intangible, cultural repository-aspect, suggesting in the earlier version that a museum "acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity," to a visitor-centered emphasis on a variety of possible experiences. As redefined in 2022, not only should a museum collect, and further "operate and communicate ethically, professionally and with the participation of communities"—all extremely valuable developments, especially regarding emerging discourse on "postcolonial" (e.g., [55,56]) or more inclusive, representative [57], and co-creative programs and presentations—art institutions now specifically have the mandate of "offering varied experiences" for a range of potentials such as "education, enjoyment, reflection and knowledge sharing". This development—also not at all new (see e.g., going backwards historically, [58–60]; or [61])—is still very much in the realm of a future aim for what arts institutions could be and how they might frame themselves and communicate their purposes to stakeholders, the public, and funding bodies.

These topics also go hand-in-hand with a rather exciting merging of empirical aesthetics or psychological study of art-related experiences as a research domain, with fields such as creative arts therapy, arts and health, curation, or other clinical, interventive, or epidemiological practice.

3. Guiding processes and outcomes as mechanism for desired impacts? Connecting VIMAP to new implications for the arts

In the following, we briefly consider how such developments, and the general desire to take a more expansive, experience-based understanding of art engagements, might be particularly supported by a model such as the VIMAP. Interestingly, many of the above ideas or points of emphasis had, in fact, been anticipated, or even directly considered, in the original paper. We had considered many affective, embodied, physiological, as well as neuronal, aspects, which do touch on many of the above emerging targets. The model was also, in some of its specific outcomes, initially based on discussions of attitude change: one of its core outcomes, the transformative experience, was specifically conceptualized to address such self- or worldview-changing aspects (see also [62]). One of the first applications of the VIMAP model by our team has been an EU-funded Horizon 2020 program ([2]; see also https://artis-h2020.eu/) on this very topic. On the other hand, aspects such as specific modulation of wellbeing, considered directly and within the scope of the emerging discourse in this domain, had not really been a main aspect of our, or, really, any, formal models in empirical aesthetics (see e.g., [5] for such a review). What follows is a taste of at least where researchers might go as we delve into these topics.

3.1. Emerging empirical evidence for VIMAP outcomes and implications

We begin with some new empirical data, and evidence that we do consistently find the proposed outcomes and (organized) elements in interactions with art.

Over the past several years (see [6]), we have been working to test the implications of the model, especially at the level of outcomes and following the organization of the original paper's discussion of various stages and related phenomenal states. This took the form of a number of studies on art engagements in which we asked people to report on their responses following a meeting with a single work of art. In an initial project, this involved 46 terms (i.e., feelings or emotions, but also terms such as "I was aware of my body," "I felt the need to stop or escape," as well as other social, bodily, or epistemic terms; "I felt epiphany" or "insight"). These were notably derived from both a literature review and from the VIMAP (i.e., key aspects tied to its components and listed in the right columns in Fig. 1 a,b).

An initial, already published paper [6] tracked such experiences from 345 individual interactions with museum art. When considering the findings at the level of individual people or artworks, we indeed find a wide range of different reactions and evaluations. However, when we combined all results for all people and artworks, using emerging network modelling techniques (see [63]) and latent profile analysis, by which we assess for shared patterns, we did identify general, distinct experience types (Fig. 3). These quite closely do align with the VIMAP, e.g.: a clear "harmonious" type, aligning with many of the argued for feelings such as a sense of harmony, absorption, wonder; a "transformative" outcome, denoted by some negative tension and anxiety, but also reflection, re-thinking, and insight; a "negative" type with reported experience of negative feelings, stress, emptiness, and generally felt confusion, anxiety, anger; as well as a "facile" way of engaging art in which we indeed found little evidence of strong feelings in either a positive or negative direction. In a subsequent program (Miller et al., forthcoming; see also [64]), we assessed over 2500 unique art experiences with over 30 different artworks from across 10+ institutions in North America and Europe. The results offer even more support for the above outcomes, as well as evidence for a fifth "novel" result.

The findings, again, provide support of the VIMAP, suggesting bottom-up evidence for its main stages and flows of components. The clustering of specific emotions into defining aspects of experience also align with our hypotheses. The clustering of responses also tended to align with other multivariate studies that had at least explored broad semantic clusters of items in participant self-reports of art experiences (e.g., see [52,65]; see for music, [66,67]). Even more, the finding of these distinct outcomes types—notably all of those specified in the VIMAP—suggested that these might be indeed supraordinate varieties, varying once again in prevalence across

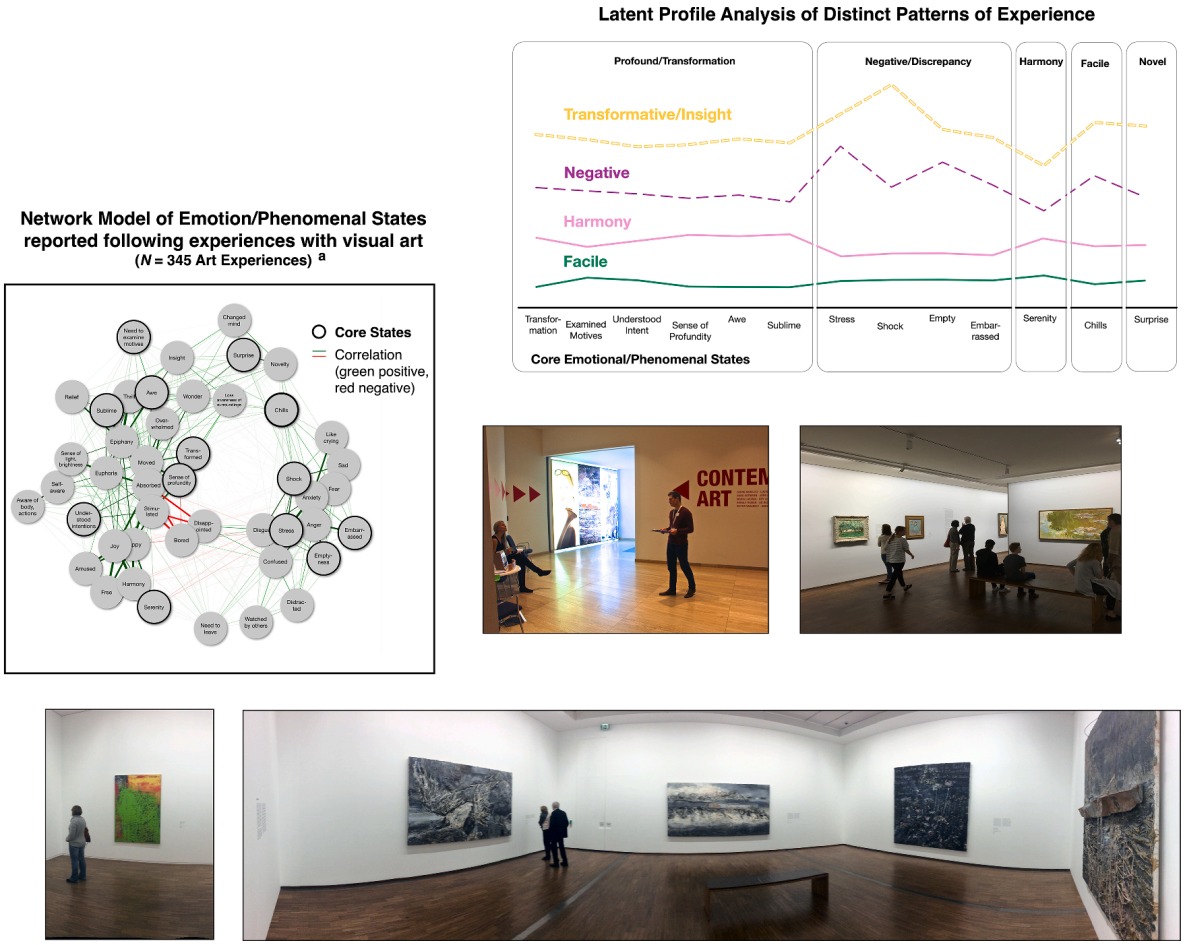

Fig. 3. Emerging Empirical Evidence for Distinct Art Experience Outcomes as Suggested in VIMAP (Top-right and middle-left, results of Network Model and subsequent Latent Profile Analysis of distinct, shared answering patterns across $N = 345$ individual experiences with visual art [6]; Middle-right/Bottom, on-site data collection and examples of included artworks, all collected from Albertina Museum in Vienna).

individual cases of viewer and art (see Fig. 4), but internally stable and which can be traceable via the reported factors.

The outcomes, and their related aspects, also showed evidence for implications. For example (see Fig. 4), at the level of appreciation, the harmonious outcomes tended to coincide with high ratings of goodness, beauty, pleasantness, interest. Negative and facile reactions showed much lower ratings. The transformative outcome showed lower ratings of artwork goodness and beauty but high

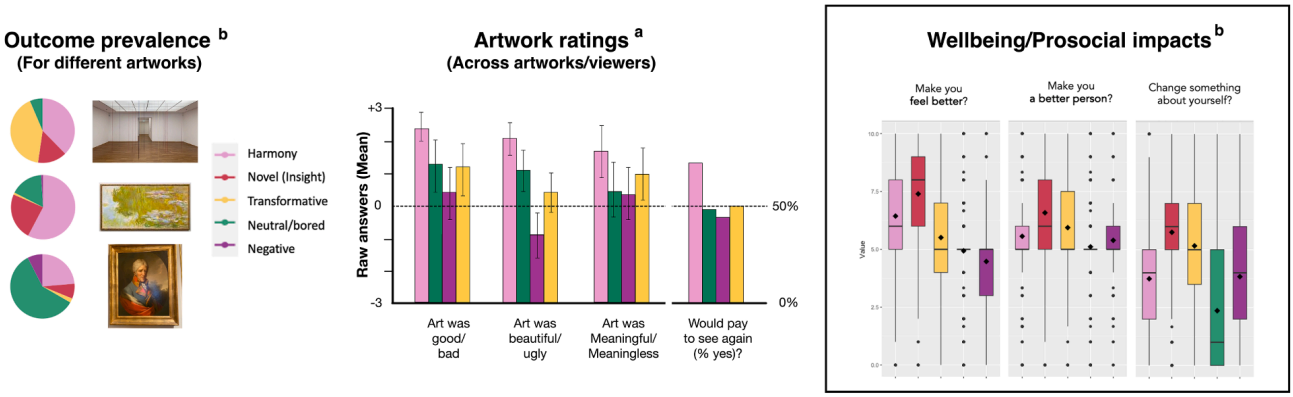

Fig. 4. Outcomes, different levels of incidence across artworks, and Implications for Wellbeing or Societal Challenges. (Left, examples of different prevalence of outcome types (i.e., % of individuals reporting outcomes) for specific artwork examples. Middle, examples of different reported artwork ratings tied to different outcome types, but across specific artworks. Right, emerging evidence for different wellbeing or prosocial impacts related to specific outcomes. [a] results from small-scale study, [6]; [b] Results from currently unpublished data collection of $N = 2740$ unique viewer-artwork interactions with 31 artworks in11 institutions [64]).

interestingness and meaningfulness. Individuals having a harmonious as well as a transformative engagement were likely to pay to revisit the artworks. Whereas people having the facile reaction would not. We also tracked aspects such as impact on mood and, in our follow-up wider-scale assessments, included such questions as: Did your experience make you feel better? Did it make you a better person? Did you change something about yourself? Connecting, again, quite different results at the level of outcome type (Fig. 4).

3.2. Thinking ahead to next steps for VIMAP—Outcomes as nuanced 'mechanisms' for desired prosocial or wellbeing benefits?

These results, we would argue, might then give an intriguing basis for consi the emergi to different emerging suggestions for especially mechanisms of experience to different ends. In Fig. 5 we have begun to use the outcomes to organize desired targets of art experience. This especially concerns the emerging discourse on the need to better understand mechanisms for desired outputs, as well to conceive and anticipate outcomes themselves as well as supported ingredients. These are divided in the model as two levels, although with these very much overlapping (i.e., one mechanism may also be an output of a particular type of engagement).[1] In all cases, however, the fundamental driver of results, we argue, is the VIMAP outcome type.

Notably, the VIMAP and its supporting new empirical data, suggest different specific pathways to certain aims. This includes the goal of self-changing, reflective results, which can be connected to, say a novel or transformative outcome. Similarly, the harmonious outcome can be tied especially to classic discussions of reduced stress and anxiety, all of which may tie to the present finding of improved mood. See also recent work by the present paper's co-author [68] that similarly examined visit-level experiences in art museums to construct profiles of visits which were then connected to wellbeing outcomes. Although not designed to directly capture all of the VIMAP outcomes, the study similarly found that experiences resembling the harmonious outcome type showed the greatest benefit to several wellbeing outcomes, including lower levels of psychological distress and heightened experiences of social connection and positive self-regard, as well as feeling more welcome in the museum and satisfied with their experience.

In our emerging, larger-scale, empirical data [64], we even find that certain outcomes (i.e., "Novel"), which appears to bridge both reflective, cognitive aspects of personal growth, insight, meaning-making, as well as aspects of harmony and visual enjoyment (but without strong negative feelings of being deeply, personally confronted), can lead to reports of both feeling better and being 'a better person' after an art visit. Even an outcome such as a "negative" result might be tied to positive outputs. A confrontation with one's self or ideals, even if not resolved in the moment, itself contains the seeds for perhaps future change in attitudes or behaviors (see for an example [69], discussed in our initial VIMAP paper).[2] This, too, could be tied to arguments for 'meaningfulness'.

These results may provide a more theoretically-robust model of a mechanism to such ends, grounded in both theoretical and empirical approaches that could be anticipated and pursued by practitioners. This also suggests that one must consider and match experiential outcomes to their desired aims—for example improving mood may be found especially through a harmonious, rather smooth, even self-escaping outcome but where one does not personally confront themselves and grow. Achieving this via a transformative end may lead to individuals reporting that they feel they are a "better person," even when they do not feel better in the moment. This finding thus supports arguments that policy and institutions need to tailor to the desired impact and against "one size fits all" initiatives. At the same time, similar results may be possible in many different instances and with different individuals, but which might share key basic psychological features in the individuals' interaction.

This discussion of outcomes and specific, distinct processes also allows for better organization of other factors, which could be thusly organized using the same superstructure. In considering, for example, aspects such as how to arrive at wellbeing ends, past research suggested that participants who rated their experience more favorably (more beautiful, good, desire to visit again) might be those who experienced the largest impacts to their mood and state anxiety. This is consistent with research that suggests experience of pleasure as a fundamental part of wellbeing. That said, a sense of meaningfulness—tied to wellbeing, and characterized as providing a sense of purpose, control, value, or self-worth—may be an even better predictor [34]. We recently tested this in online art viewing studies [34], with an artwork type often related to harmonious but also novel outcomes, and found that wellbeing (anxiety, positive and negative mood) changes were better predicted by such a sense of meaning. Whereas pleasure, or liking the art, only predict changes in positive mood. This also matched our larger-scale data, in which "novel" encounters, which included both positive emotions but also self-reflection, led to higher mood impacts than just positive experiences.

That said, several experience types (novel, harmonious, transformative, perhaps sometimes even negative) might lead to meaningful reports, returning to the idea that there may be several paths to desired findings. This also implies that, say, meaningfulness, which can be thought of as a "mechanism", is in some way a broad category which can be further broken down based on the specific outcome flows in the VIMAP.

[1] To give another example of the acknowledged complexity of such outputs, see a recent review by Aughterson et al. [37], who similarly claim: ... it is likely that multiple mechanisms are involved, interact, and are additive to one another ... The mental health *outcomes* of such activities (e.g. reduced anxiety) likely arise through the interactions of these mechanisms, which are activated by multiple *ingredients* (specific components within an activity), mediated by various *moderators* (individual-level and wider environmental, economic, and cultural factors that can affect engagement..."

[2] As we had recounted in original [1] paper (p. 106): "Roald ...reports interviews with museum visitors where they find themselves in what we would classify as Outcome 4 [i.e., "Negative"] after a first, and even a second meeting—even in one case, reporting a viewer who took Art History classes in order to better understand a particular work—and who may then finally arrive at Outcome 5 [Transformative]. See also the case of Danto, who reported that his meeting with the Brill box required 20 years..."

Suggested Wellbeing Impacts

Art Experience Outcomes ("Mechanisms of Action")	Key empirical factors*: Physiological/ behavioral response	Key empirical factors*: Emotion/ Phenomenal States (accumulate through experience)	(Sub-)Mechanisms/ Mediating outcomes	Target (final) outcomes
Outcome 1 (Facile') Default art-viewing, based on cursory engagement. Short duration, low self relevance or interest	low arousal	depicted emotion (pos./neg., low arousal). Little felt emotion	LOW pleasure, meaning, beauty. LOW arousal, self-confrontation, immersion	– –
Outcome 2 (Novelty, insight) Change low-level scheme, often by expanding classification without high self-threat. Learning, seeing something new, aesthetic cognitivism	increased skin cond., decreased heart rate (novelty), increased heart rate variability (surprise)	pleasure, excitement, bemusement, tension, surprise, thrill, novelty, confusion, insight, playful, sublime (awe), beauty , active engagement	HIGH Pleasure, beauty, Meaningfulness, HIGH arousal, cognitive stimulation, new perception, reflection	'Feel better', hedonic wellbeing (positive + negative mood), anxiety, stress. ' Better person' (behaviour, idea change), eudaemonic wellbeing, emotion regulation (change/reflect), stimulated attention, empathy, Identity maintenance (change), resilience, empowerment, self-confidence, personal growth, openness to experience.
Outcome 3 (Flow, Harmony, Emotional resonance) High mastery; high schema congruence and high self-relevance	high arousal, increased skin conductance, chills, spreading activation, sense of luminosity	harmony, pleasure, happy, absorption, being moved	HIGH Pleasure, beauty, (Meaningfulness?) HIGH Immersion, arousal, (possibly cognitive stimulation, reflection, *after experience*)	'Feel better', hedonic wellbeing (positive mood). Emotion regulation (reinforce), Identity maintenance (reinforce), (resilience, empowerment?), stimulated attention, (eudaemonic wellbeing?).
Outcome 4 (Negative) Uncomfortable confrontation that is unresolved or escaped from (secondary control). Low schema congruence + high self relevance	high sympathetic arousal ("fight or flight"), fidget, talk to others, leave	confusion, anxiety, need to stop, anger, shock, disappointment, nervous, shame, embarrassed, sad	LOW pleasure, meaning, beauty. Arousal, self-confrontation (possibly cognitive stimulation, reflection, *after experience*)	LOWER hedonic wellbeing (negative mood increase), 'Feel worse'. LOWER resilience, empowerment, emotion regulation (suppress), identity maintenance (reinforce), (Possibly spur future action, reflection)
Outcome 5 (Insight, Transformation) High self-relevance, schema incongruence with high coping need. Schema change (high level).	sympathetic + parasympathetic, (higher skin cond./ heart rate, lower respiration)	shock, anger, anxiety, elf-aware, aware of body. epiphany, insight, moved, relief, catharsis, happy, pleasure, wholeness, transformation, connectedness,	HIGH Meaningfulness, HIGH arousal, HIGH cognitive stimulation, self-confrontation, new perception, reflection LOW pleasure, (beauty?)	'Feel worse' (in the moment), LOW hedonic wellbeing (positive + negative mood), anxiety, stress. 'Better person' (behaviour, idea change), eudaemonic wellbeing, emotion regulation (change/reflect), empathy, Identity maintenance (change), stimulated attention, resilience, empowerment, self-confidence, personal growth, openness to experience

Fig. 5. VIMAP outcomes, and proposed mechanisms/impacts for wellbeing, health, societal challenges, Organized via Distinct Art Experience Outcome Types. (Note: 'Outcomes' refer to the five outcomes as originally specified in [1] VIMAP model, representing unique types of art experience, and as recently verified in empirical museum data collections of art experience (see [6]). Wellbeing impacts derived from selection of recent review and theoretical papers ([37,39,40]; Thapa et al., 2023; Trupp et al., subm.). * Emotion, phenomenal states slightly modified based on recent empirical findings).

3.3. Other findings, emerging models, and connections to VIMAP at wellbeing levels

VIMAP could also allow organization and clarification of other theoretical and empirical arguements. For example, the RAISE mechanism model ([39,40]; Thapa et al., 2023) proposes five pathways through which engagement with the arts and humanities may influence wellbeing (in this case centered on the topic of "flourishing"): reflection, acquisition, immersion, socialization, expression. Preliminary research suggesting, for example, that "*immersion*" [70,71] or "*reflection*" [68] when engaging with art may be key mechanisms to greater benefits. Thinking of how and when these aspects may be particularly salient, in the VIMAP outcomes, we might propose a Harmonious engagement for the former, but a more Novel/Transformative response for the latter, especially due to the links with change in the self and becoming a better person (see these factors' location in Fig. 5). This then raises interesting implications for design or interventions: we may want to design an experience that targets the specific outcomes for specific ends.[3]

The VIMAP may similarly help to contextualize other aspects that, potentially, could be key targets. For example, in addition to hedonic impacts on wellbeing via the arts (i.e., art making us feel better) especially eudaimonic wellbeing changes (feeling a sense of purpose or meaning in one's life) may be a particular outcome that can be achieved via art viewing but also which might be particularly salient via art versus other means. A recent systematic review of art-viewing interventions [72] found, in fact, that eudaimonic wellbeing changes were the most consistently significant factor across matched pre-post studies with control conditions. Albeit, this was only in four studies—speaking more than anything towards to great need for more data, the emergence of this topic, and the need for systematic theoretical frameworks to consider how eudaimonic or other wellbeing outcomes (here, as in Fig. 5, we would argue especially Outcome 2/5, Novel/Transformative mechanisms) might be achieved. Returning to other mechanisms/impacts, the Trupp et al. [72] paper also identified several other candidates (i.e., "*Affective processes*"/*Emotion regulation/Pleasure*; "*Cognitive processes*"/*Attention*; "*Transformation*"; see Fig. 5 for possible locations in VIMAP).

A recent review by Aughterson et al. [37] on mechanisms of action for psychosocial well-being similarly suggests several aspects, including Psychological targets of "*increased self confidence,*" "*self esteem,*" "*purpose/meaning,*" "*sense of achievement,*" and "*pleasure*" all of

[3] Note, here we did not try to connect with, for example, social aspects noted in this and in other discussions, as these raise a whole additional layer of aspects, but also rather beyond the individual artwork experience.

which might be organized to various outputs (once again especially Novel and Transformative for the former targets, but also Harmonious for the latter). They also suggest behavioral outputs such as increased *"openness to experience*," which might be found via transformative, self-referential meetings with art [62]. See Fig. 5 for our placement in the VIMAP outcomes.

Discussions of other aspects such as *resilience* or *emotion regulation* [73] could also be connected to certain outcomes. Notably, the latter might come through taking a more controlled, but also immersive engagement with the environment (i.e., the Harmonious outcome), which notably could involve both positive and negative valence. The Novel outcome, where one might be forced to reflect on certain feelings which could even surprise one, might also act to allow for regulation strategies [74]. Topics such as empathy might also be connected (see e.g., [75] who suggested that this may come through any of the outcomes, but with this still very much at the level of pure hypotheses). In sum, by providing a nuanced basis of distinct, but shared, outcomes, we may create a unifying and applicable means of discussing mechanisms that could lead to such ends, beyond the present approaches to date.

The above aspects, and a more individual-centered, experience-based discussion of a varied art expereince, which might follow different paths and towards a range of outcomes and implications, can also touch the last development above, regarding the more institutional framing of the arts. We would argue that it is such a nuanced and varied basis, if understood and comunicated to viewers and stakeholders, that might also provide a key tool for institutions and especially for reframing how art might be a valuable feature for many, many individuals. To quote Tucker [60]: "If museums spoke with another kind of voice, …one that elicited and valued an experience-based response to works of art rather than an information-based one; if underlying the planning, design, and interpretation… was the assumption that there is no one way to look at art and no single correct interpretation of it; then the visual arts might seem a lot less alienating to people. But that would require a radical change in institutional attitudes".

4. Conclusion

As art engagement is increasingly being discussed and implemented as a form of intervention, the need for nuanced, multivariate, but also integrated answers to the breadth of means art may have an impact on our health, lives, and behaviors will only be increasing. Utilizing a model such as the VIMAP framework to better understand what forms of experiences 'are' and how they are—theoretically and empirically—likely to produce the desired outcomes may, we would argue, an intriguing solution to this demand. Existing examinations of interventions have often lacked specific theoretical grounding about *why* a particular intervention would work as expected; the VIMAP provides an important step through articulating specific varieties of art experiences. While this may certainly not be the only solution, such an experience-level approach may provide an important advancement especially in regards to the discussions of the mechansims—here conceived as nuanced bit also shared ways of experience. Further integrating the VIMAP with other theoretical approaches may be especially fruitful, as interventions seek to design for specific outcomes.

Ultimately, the VIMAP represents a theoretical grounding and launching off point for research programs and practical applications within art. This work has already begun, as we've highlighted here, and yet there is still much work to do. The VIMAP allows us to reorient our way of thinking about art experience by moving beyond consideration of the internal processes of the experience (e.g., meaning-making, feature processing) to connect to more holistic experiences that are connected to more sustained impacts. As we continue to understand the experience types introduced in the VIMAP, there are wide-reaching implications for this work, from better understanding the nuances of the impacts of art engagement to informing intervention designs and shaping the emerging arts and health movement.

Declaration of competing interest

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3.3. Ongoing Applications.

In discussing extensions and applications of the presented Experience Types, I have so far explored the relationship between individual differences and reported phenomenal experience, as well as considered, from a theoretical perspective, the value this framework may bring to critical investigations of the impacts of arts engagement. Next, I present short reports of two ongoing projects which directly apply the Experience Types identified in Miller et al. (2025 [2.2]) to new empirical studies. These investigate the potential neural correlates of art experiences in the museum [3.3.1] and the experiential differences between viewing genuine artworks in the museum and digital replicas in the lab [3.3.2].

In both studies, we employed the 16-item list of identified 'core items' as a behavioral measure, which participants completed immediately after an art-viewing experience. The measure was presented with the same prompt ('While viewing the artwork, I felt...') and scale (11-point unipolar, Likert-type scale; 0, 1-10: 0 = 'Not at all'; answers from 1–10 corresponded to incidence of a feeling and relative magnitude, with 10 = 'Very much so') as was used in Miller et al. (2025 [2.2]), and a similar criterion for missing data (no more than 2 items, 12.5%) was used to verify data quality and inclusion.

New experiential reports were then fit to the LPA model selected in the original study; that is, participants were assigned to one of the previously identified ExpType groups based on their reported phenomenal experience. We did this via a confirmatory latent profile analysis (CLPA) with deterministic constraints that describe the standardized means and variances of each item for each profile. This type of constrained analysis ensures that the character of the profiles themselves does not change with the introduction of new data; new participants are simply matched to one of the existing profiles. Future work may and should consider the stability of the specific five-profile solution, given new data with fewer constraints, though this falls outside the scope of the present work.

As in Miller et al. (2025 [2.2]), participant reports are individually assigned to an ExpType profile through the CLPA, and auxiliary analyses can then be conducted to assess groupwise differences in secondary variables (e.g., liking, meaningfulness) independent of

the original dataset. ExpType profile can be further applied as a grouping variable to assess the specific research questions of each study: (How) does brain activity vary between ExpType groups [3.3.1]? How does (digital) context affect ExpType distribution (3.3.2)?

3.3.1. Art Experience in the Brain.

As empirical aesthetics has broadened as a field, neuroaesthetics has developed as a distinct subfield which studies the manifestation of aesthetic experiences in the brain (for review, see Chatterjee & Vartanian, 2014). To date, fMRI has been the most widely applied method in neuroaesthetics and has been used to address a wide range of questions: locating beauty in the brain, role of motor simulation in the perception & processing of artworks, the role of predictive processing and reward in aesthetic preferences, expertise, and more (Cross, 2015; Cupchik et al., 2009; Jacobsen et al., 2006; Kawabata & Zeki, 2004; Kirsch et al., 2016; Vartanian & Skov, 2014; Vessel et al., 2012, 2013). While these studies have provided valuable insights, use of this method is necessarily limited to the laboratory. The extreme setting of a fMRI machine leads to difficulties generalizing results from costly, lab-based studies to broader conceptions of aesthetic experience in 'real-world' contexts. These concerns are partially addressed by studies utilizing EEG (Kontson et al., 2015; Orgs et al., 2024; Rai et al., 2024; Shourie et al., 2013; Strijbosch et al., 2022), though these are often limited in their ability to directly connect activity to specific brain regions.

An emerging method in the cognitive sciences—functional Near-Infrared Spectroscopy (fNIRS)—offers a relatively new, non-invasive method for mobile brain imaging. fNIRS utilizes near-infrared light, which has the ability to propagate through the skull and is differentially absorbed or scattered by (de)oxygenated hemoglobin, to continuously measure relative changes in neural activation in cortical brain regions (Liu et al., 2021; Pinti et al., 2020). This method allows for unrestrained use, unlike fMRI, while providing higher spatial resolution and better motion artifact performance than EEG (Pfeifer et al., 2018; Piper et al., 2014; Scholkmann et al., 2022), making fNIRS particularly well suited for use during real-world activities and in ecologically valid settings (Baker et al., 2017; Dybvik & Steinert, 2021; Pinti et al., 2018; Waldert et al., 2012). fNIRS has also

been shown to be effective in investigations of cortical neural correlates associated with aspects of higher-order thought, including empathy and theory of mind (Hyde et al., 2018; Pelowski et al., 2016; Vanutelli & Balconi, 2015).

fNIRS has still rarely been used in even laboratory-based aesthetics research; when it has, studies have sought to investigate various higher-order cognitive processes which are proposed to be relevant in art perception or creation (Casale et al., 2024; Clemente et al., 2024; Greaves et al., 2022; Kreplin & Fairclough, 2013; Pelowski et al., 2016, 2017b; Yang-Zhuo et al., 2022). To the best of my knowledge, only one previous study has utilized fNIRS in a museum environment (Dupuy et al., 2024)[9]. Here authors investigated the acute effects of a museum visit on wellbeing in older adults, specifically looking into the potential role of prefrontal engagement in explaining such effects; they did not assess 'aesthetic experience' directly in any way. So, to date, there is no ecologically valid, museum study utilizing fNIRS to investigate the neural activity associated with art experience.

I, along with Theresa Demmer, devised of and conducted a preregistered, exploratory study, in which we paired mobile fNIRS with the list of 16 'core' items from Miller et al. (2025 [2.2]) to investigate the neural correlates of in-museum art experiences. We applied the original LPA solution to newly collected data and used the defined ExpType groups to examine potential differences in neural activity associated with phenomenal reports. This study sought to a) test the ability of the original five-profile LPA solution to be applied to new data, as well as the stability of reported experiences, b) assess the feasibility of using mobile-fNIRS in a museum setting, and lastly, c) exploratorily investigate potential differences in neural activity (in selected cortical regions of interest, ROIs) between the groups of participants who reported different ExpTypes.

The following report will focus on primary behavioral results, and, within the context of the broader dissertation, serve as a case study for applying the 16-item measure of phenomenal art experience to new and future investigations. As such, analysis of the collected fNIRS data, which is underway, will not be reported on here but will be included in the final manuscript submitted for publication. We also utilized eye-tracking glasses in

[9] A handful of studies have utilized mobile EEG (e.g., Castiblanco Jimenez et al., 2023; Cruz-Garza et al., 2017; Palmieri et al., 2024; Tomio, 2016).

this study, gaze data from which will not be analyzed here or in the final manuscript; we included eye-tracking solely to verify procedural adherence and to align fNIRS data segments with the actual art-viewing period (see further details in Methods below).

Miller, S. L.*, Demmer, T.*, Pizzolante, M., Pastor, M., Eksi, C., & Pelowski, M. (2025). *fNIRS at the Museum: Investigating the neural correlates of art experience.* [Manuscript in preparation].

*co-first authors

Contributions:

TD and I conceptualized and developed the study and methods, under the supervision of MP. MPi and CE also contributed to study development. TD, MPi, CE, and I conducted the data collection. MPa and I conducted behavioral data analysis, and MPa contributed to fNIRS data cleaning and analysis. TD and I will continue to analyze the data, interpret results, and develop the manuscript. All authors will be given the opportunity to provide feedback on the manuscript in advance of submission.

Methods and Materials.

Following the exclusion of one participant who viewed the incorrect artwork, the study included 88 participants (65/73.9% female; M_{age} = 28.85, *SD* = 10.04; 33.3% Austrian, 24.1% German). Participants showed a range of prior engagement with art, but on average reported moderate general knowledge of art (*M* = 4.87, *SD* = 1.94) and high liking (*M* = 7.95, *SD* = 1.72), comparably to previous museum studies (Miller et al., 2024, 2025; Pelowski et al., 2017a). All participants were included in behavioral analyses (*N* = 88); 15 participants will be excluded for fNIRS analyses, due to data loss or procedural disruptions (*n* = 73).

Both students (*n* = 21) and non-students[10] (*n* = 63) were recruited for the present study. An additional four museum visitors participated spontaneously after seeing the study taking place and expressing interest[11]. All participants recruited in advance received

[10] Non-student participants were recruited via the Study Participant Platform of the Vienna Cognitive Science Hub, which uses the hroot software (Bock et al., 2014).

[11] To our knowledge, these four participants did not see the target artwork on their own before participating in the study. We intentionally only recruited visitors spontaneously before they entered the gallery which held the target artwork. These visitors most likely did see other artworks or exhibitions in advance of participating in the study, while participants recruited in advance did not, as they participated immediately upon their arrival to the museum.

a free ticket to the museum (17eur equivalent) as compensation and were welcome to visit other exhibitions after their participation in the study was complete. Student participants additionally received study participation credits for their degree courses. Participants recruited spontaneously did so for no compensation. The study was preregistered (https://doi.org/10.17605/OSF.IO/CWNZR) and followed all protocols of the ethics board of the University of Vienna.

The study was conducted in the Albertina Museum in Vienna; all participants viewed *The Water Lily Pond* by Claude Monet (1917-19) (Fig. 1). This artwork was chosen from the set of stimulus artworks included in Miller et al. (2025) to have a comparative dataset for assessing the applicability/validity of the primary behavioral measure used for calculating participant experience types. This artwork further showed, in the original data, a reasonable distribution of primarily the Harmonious, Novel, and Disengaged experience types (Fig. 2, lefthand side). This allowed us to select ROIs (see details below) that would target distinguishing these types (with reasonable group-level sample sizes), while leaving investigation of the Negative and Transformative types to a later study. Additionally, this artwork offered an ideal location within the museum; the Monet is on view in the first room of the permanent exhibition, with a foyer just outside where the pre- and post-viewing procedures took place.

Upon arrival to the museum, participants completed a pre-viewing questionnaire (including demographics, art interest/expertise, and mood). They were then fit with the fNIRS device and eye-tracking glasses (details below), while receiving directions for the study procedure. This was followed by fNIRS calibration and a signal quality check. After sufficient signal quality was confirmed, participants stood in front of a fixation cross and completed a 30 second baseline block. At the end of 30 seconds, they were shown into the gallery and directed to the artwork. Participants were instructed to view the artwork for however long they liked, and how they usually would. When they felt their experience with the artwork was 'complete,' they returned to the researchers in the lobby outside. The fNIRS device was removed and participants completed a post-viewing questionnaire. This questionnaire included a repeat measure of mood, the 16-phenomenal items for identifying experience type (details of analysis below), and a series of aesthetic appraisals and impact measures (e.g., liking, beauty, meaningfulness, if they felt better, felt changed).

This post-questionnaire closely matched that used by Miller et al. (2025) to allow for descriptive comparison between the present and original datasets.

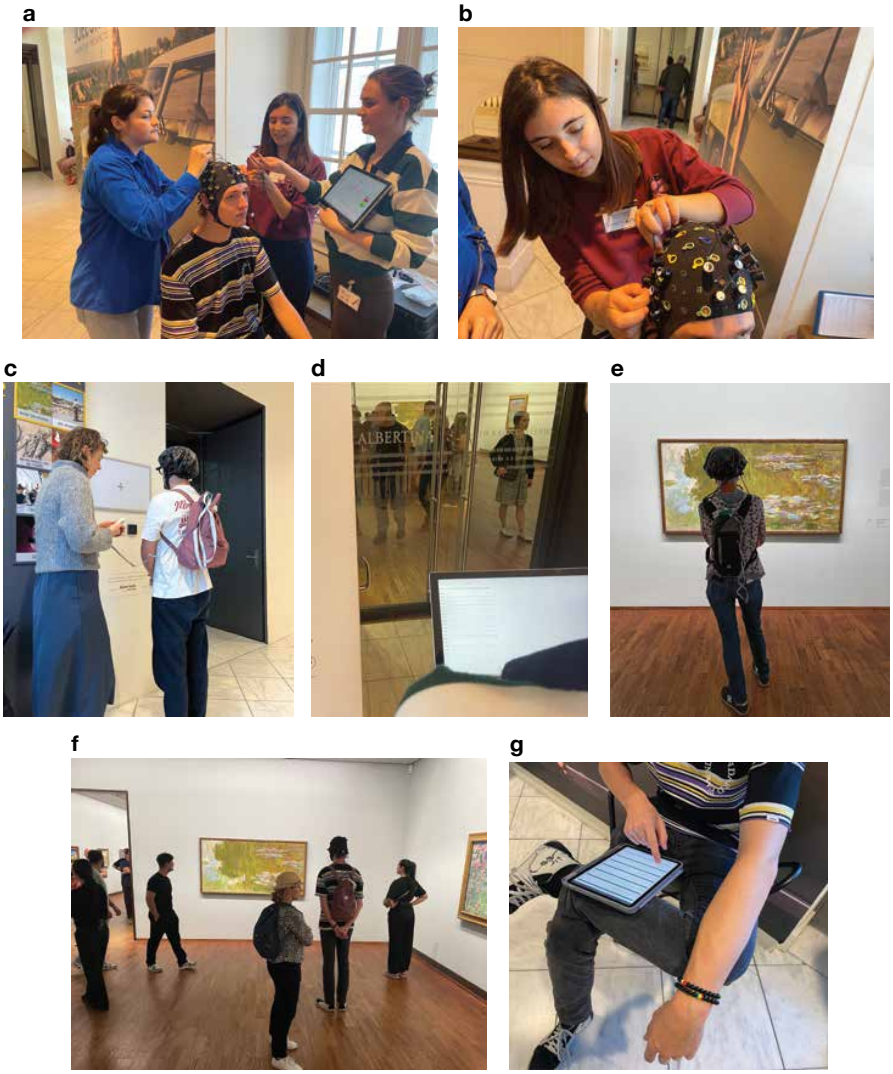


Fig. 1. Procedural images from present study of neural correlates of art experience, with *The Water Lily Pond* (Monet). Images from data collection at the Albertina Museum (Vienna, AT) in October 2023. **a-b**) Members of the research team (left to right: MPi, Elisa Kramer [intern], and SM) setting a participant up with the fNIRS cap and optodes. **c**) Researcher conducting the baseline measurement with a participant (TD); she is holding the manual trigger device, which was clicked in the participants eyeline to allow us to later sync the fNIRS and eye-tracking data streams (the trigger remove was then gently placed in the backpack holding the NIRX device. Participants completed a minimum 30-second baseline while looking at the fixation cross outside the gallery. After the measurement was complete, the researcher opened the door to the

gallery for the participant to enter and begin the art-viewing block. **d**) Researchers' view of the gallery while a participant was inside completing the art-viewing block. We could clearly see the target artwork and observe the participant without disturbing their experience. **e-f**) Participants in the gallery viewing the artwork. **g**) Participant completing the post-viewing questionnaire after their experience was complete and the fNIRS device was removed.

ROIs were selected based on their relevance to potentially distinguishing the Harmonious, Novel, and Disengaged ExpTypes. We targeted regions related to higher-order thought and self-reflection (medial prefrontal cortex, Nakamura & Kawabata, 2015; Vessel et al., 2012), empathy (right inferior temporal gyrus, Jacobsen et al., 2006; Mackes et al., 2018; right anterior temporal lobule, Vartanian & Skov, 2014). We also included the dorsolateral prefrontal cortex, as this area has repeatedly been implicated in aesthetic appreciation and cognition (Cattaneo et al., 2014; Cupchik et al., 2009), as well as experiences of 'being moved' (which has been further associated with heightened activity in the default mode network; Vessel et al., 2012) ratings of which are much higher for Harmonious and Novel experiences than Disengaged (Pelowski et al., 2017b; Miller et al., 2025).

fNIRS data was recorded by a continuous-wave fNIRS, 8x8 NIRSport2 (NIRx Medical Technologies GmbH, Berlin, Germany) via Wi-Fi. Near-infrared light with wavelengths of 850 and 760 nm was emitted and detected with a sampling rate of 10.17 Hz. The optode array consisted of 8 dual-tip LED sources and 7 SiPD detectors. Eight short channel detectors were additionally included using the 8th SiPD detector. Data acquisition was acquired by the Aurora fNIRS software. Data/signal quality was checked for each participant with the automated signal optimization algorithm built into Aurora, as well as the MATLAB GUI application PHOEBE (Placing Headgear Optodes Efficiently Before Experiment; Pollonini et al., 2016) which measures coupling between fNIRS optodes and a participant's scalp.

Eye-tracking data was collected by Pupil Invisible (Pupil Labs GmbH, Berlin, Germany). Pupil Invisible is a deep learning powered eye tracking system with three integral parts: eye-tracking glasses (with two eye cameras), companion device (calculates

gaze-data in real time white recording) and cloud (fixations are calculated automatically in Pupil Cloud). Gaze data (saccades, fixation duration, etc.) will not be analyzed in the present study; videos recorded by the eye-tracking glasses were only used to trace procedural stages (i.e., baseline start and end times, art-viewing start and end times) and confirm instruction adherence (i.e., confirm participants attend only to the designated artwork during the art-viewing period).

Both data streams (fNIRS and eye-tracking) were time-anchored and aligned by pressing a manual trigger in the field of view of the eye-tracking glasses. The 30-second baseline block began with this manual trigger, after which time the participant entered the gallery. The recorded eye-tracking videos were used to identify the moment participants began viewing the target artwork, to denote the beginning of the 'art-viewing' segment in the fNIRS datastream.

Preliminary Results and Discussion.

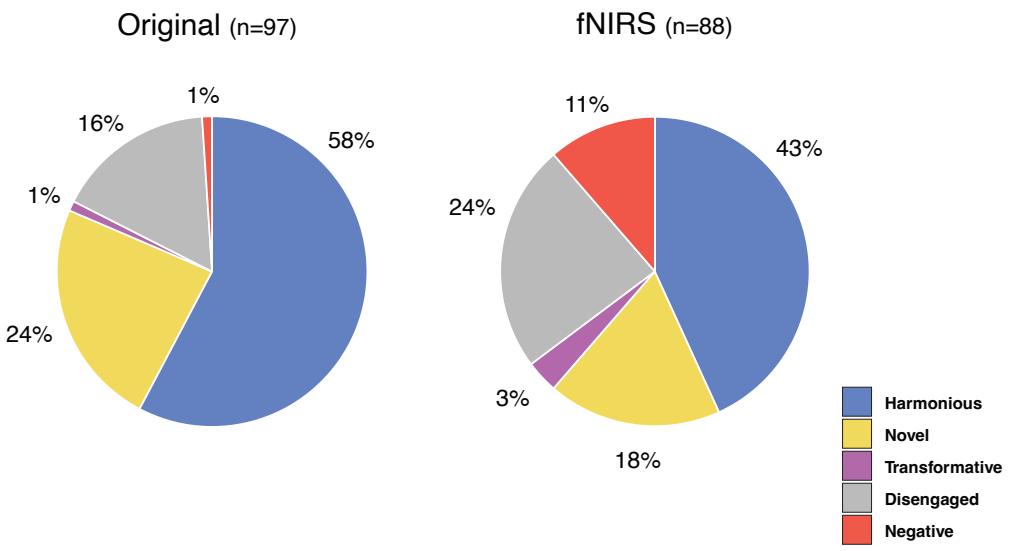
To assign new participants to the already identified Experience Types (Miller et al., 2025), we conducted a confirmatory latent profile analysis (CLPA) in Mplus 8 (L. K. Muthén & Muthén, n.d.). From the original LPA in C3, we extracted the standardized mean values and variances and incorporated these as deterministic constraints for the new analysis with the participant reports of the present study. In the confirmatory analysis, the algorithm does not recalculate what the specific profiles are, it merely assigns the new participants to one of the five pre-defined profile groups.

Two statistics in particular are valuable in the context of interpreting the model fit of a singular CLPA (rather than others which are valuable during the comparison between e.g., four- and five-profile solutions of the original LPA[12]): entropy and average latent class posterior probabilities (ALCPP). For both statistics, higher values (closer to 1) are preferred. Entropy describes how well the profiles are distinguished and defined by the model solution; values over 0.8 are broadly accepted (though there is no agreed upon cutoff; B. O.

[12] In the typical use of LPA, multiple solutions are conducted with varying numbers of profiles. Models are compared and selected according to a wider range of fit indices, including Akaike and Bayesian Information Criteria and Loglikelihood. The potential interpretation of these metrics in the context of a single confirmatory model is rather ill-conceived. The indices for the present CLPA model are nonetheless reported here: AIC = 3641.949, BIC = 3641.949, LL = -1820.974.

Muthén, 2008; Weller et al., 2020). ALCPP represents the average probability that each participant genuinely belongs to the class they were ultimately assigned to and can be interpreted as a measure of individual assignment confidence; values over 0.9 are preferred, though values over 0.8 are considered acceptable (Weller et al., 2020). The CLPA for the present study showed an entropy value of 0.887 and ALCPP of 0.915 (with averages for individual profiles ranging from 0.821-0.961[13]). High values for both of these criteria supports the fit of new data to the existing five-profile solution identified in Miller et al. (2025).

The distribution of ExpTypes in the new dataset, via the discussed CLPA, is shown in Fig. 2 (righthand side); the figure also includes a comparison to the reported experiences of the Monet from the original dataset (lefthand side; Miller et al., 2025). In the newly collected data, the most common ExpType was Harmonious (38, 43.2%), followed by Disengaged (21, 23.9%), Novel (16, 18.2%), and Negative (10, 11.4%); very few people reported a Transformative experience (3, 3.4%). This proportional order of occurrence closely reflects that of the original. The new dataset shows higher levels of Disengaged, Negative, and Novel, and lower levels of Harmonious experiences.



[13] While all values are within the acceptable range, a profile-level ALCPP of 0.821 is on the low end of this range. This value came from the Transformative group, which only included three participants and was not highly relevant for the target artwork (in the present or original datasets). As such this low value is not of too much concern. Excluding the Transformative group, the mean population level ALCPP was 0.939 (range = 0.911-0.961).

Fig. 2. Distribution of reported Experience Types in response to *The Water Lily Pond* (Monet) in two datasets. The original dataset is from Miller et al. (2025); the fNIRS dataset reflects new data collected with the same artwork for the present study. Chi-squared analysis did reveal a significant, albeit weak to moderate, difference in Experience Type distribution between the two datasets.

We did observe a weak-to-moderate difference in proportions of reported ExpTypes with the Monet between the original and present datasets ($\chi^2_4 = 13.336$, $p = 0.0097$, Cramer's $V = 0.268$; Fig. 2). This difference may likely be attributed to one of two important differences between the two study designs. Firstly, nearly all participants in the present study were recruited in advance and brought to the museum specifically for the study (85 out of 89), while participants in the original study were convenience sampled from already-present museum visitors. Different recruitment methods lead to sample-level differences in museum visit motivations, and potentially expectations, both of which have been shown to affect individual experience (Brida et al., 2016; Mastandrea et al., 2007; Tröndle et al., 2014). A second possibility is potential effects of integrating the fNIRS device itself; the device necessitates a more extensive pre-study than the original and, while minimal, can cause some minor physical discomfort (i.e., pressure from the optodes felt on the scalp). Further, some participants may have felt self-conscious (or even simply more self-aware) while wearing the device in a public gallery around other visitors, which may have influenced their experience. These design confounds may help explain why we see higher rates of Disengaged & Negative experiences in the fNIRS dataset.

fNIRS Analysis Plan.

With the forthcoming analysis of the fNIRS data, we will address three primary research questions: 1) Within participants, are there observable differences in brain activity patterns in the ROI between baseline and art-viewing periods? 2) Between behaviorally assigned ExpType groups, are there differences in brain activity patterns in the ROI during the art-viewing period? 3) Is there a relationship between select behavioral variables and brain activity patterns in the ROI activation during art-viewing across all participants (regardless of ExpType assignment)?

Insufficient data quality or procedural issues resulted in the exclusion of 15 participants for the neural analyses: 8 were excluded for total fNIRS data loss (i.e., software crash, Wi-Fi signal disruption, acquisition device power loss), 3 for eye-tracking data loss (resulting in no reliable way to identify start of artwork viewing), 4 for other procedural issues (i.e., interruption of start of experience by security or another visitor, too short viewing-period). We will further exclude participants who reported Transformative experiences, as they reflect too small of a group to validly assess (n = 2, of participants with neural data of an acceptable quality). As such, fNIRS analyses will include a final group of n = 71 participants. The ExpType distribution of this group is comparable to that of the full participant population: Harmonious (35, 49%), Disengaged (16, 22.5%), Novel (11, 15.5%), and Negative (9, 13%).

All fNIRS data preprocessing will be done in MATLAB. Preprocessing will include the following steps: quality check with QT-NIRS toolbox, pruning of individual channels (according to thresholds set by visual inspection), conversion to optical density, motion artifact correction, bandpass filtering, and conversion to oxygenated, deoxygenated, and total hemoglobin. Following these stages, fNIRS data will be compared, in each ROI[14], between groups to assess the research questions defined above. First, within-subjects t-tests will be run between baseline and art-viewing periods, for each of the ROIs. Second, between-subjects ANOVAs will be run between ExpType groups, again by ROI. Lastly, linear regressions will be performed (per ROI, across all participants) to examine the relationship between other behavioral variables and ROI activation.

Discussion.

Through this study, we demonstrated the application of the Experience Type framework introduced by Miller et al. (2025) to new datasets of art experience reports. The conducted CLPA showed high model fit and confidence in individual profile assignments, and auxiliary analyses showed the ExpTypes has similar relationships to secondary variables. These findings support the stability and replicability of the identified ExpType profiles across independent datasets of experiences with the same artwork in the same

[14] All analysis will be done with the average over the ROI rather than on a channel-by-channel basis. ROI will not be excluded when one of its channels has been excluded.

setting. Additional work should be done to test this stability across new artworks and settings.

Beyond promising behavioral results, we were successful in collecting good quality fNIRS data from 73 participants (before the exclusion of $n = 2$ Transformative experiences) in the museum, with a wireless acquisition set-up. This supports the feasibility of continued utilization of mobile fNIRS in the museum and other field settings. It is also worth noting that no participants were excluded from fNIRS analysis due solely to low data quality. Further, the frequency of procedural issues that resulted in fNIRS data loss decreased over the course of data collection, as we adjusted to the field setting and learned how to better avoid these losses (e.g., regular rebooting of the data acquisition software and resetting of Wi-Fi connection to the fNIRS device). With this, we are confident in the future use of mobile fNIRS in museums and other field settings, which opens new possibilities for ecologically valid investigations of the neural correlates of experiences with art and other aesthetic stimuli.

As work on this study progresses, we will use the LPA-derived ExpType assignments to guide groupwise analyses to identify potentially variant neural activity between Experience Types. Results will not only contribute to further characterizing the specific ExpTypes but may provide broader insights into how art experience manifests in the brain.

3.3.2. Digital Art Experiences.

Up until this point, all empirical studies discussed in this thesis have been conducted in the field, specifically in museums and other institutional arts settings. As touched on in the general introduction, empirical aesthetics has a longstanding tradition of laboratory studies, with a comparatively recent trend towards museum studies and more intentional consideration of the role of context in shaping aesthetic experience (Brieber et al., 2015; Grüner et al., 2019; Pelowski et al., 2017a; Specker et al., 2023; Specker, Fekete, et al., 2021b). Even as recent years have seen a global shift towards digital and online art experiences in everyday and research settings, few studies directly compare experiences with art in the lab to those in the museum (Darda et al., 2025; Jonauskaite et al., 2024; Pelowski et al., 2017a; Specker et al., 2017; Szubielska et al., 2021). Recent work also explores the impacts of digital arts engagement, particularly on wellbeing and flourishing (Alpys et al., 2025; Cotter et al., 2022; Trupp et al., 2022); these studies tend to focus on hedonic response and aesthetic judgements (liking, preference, beauty) and rarely explore *phenomenal* experiences across contexts or settings (Darda et al., 2025). Despite the common intuition that there is there is a subjective difference between the lived experiences of art in these spaces, empirical studies find fewer significant differences in aesthetic ratings across contexts than expected, and when studies do identify differences, these tend to be associated with small effect sizes, if reported (see Specker, Fekete, et al., 2021a for a recent meta-analysis).

Given our new findings of distinct phenomenal experience types, and the timeliness of the question of technological context, it would be valuable to see how the identified ExpTypes fit into existing conceptions of the role of context. We sought to investigate the effects of context through a new lens, and in particular, explore how this experiential framework and the identified ExpTypes may be applied to uncover how context affects hedonic experience (appraisals and judgements) by way of felt experience. With this approach, we will be able to identify potential differences in contextual effect depending on reported experience.

The following study looked to directly compare reported phenomenal experiences in the museum (Miller et al., 2025 [2.2]) to those had with digital replicas in a traditional

laboratory context. With a subset of eight artworks from the original set of stimulus artworks, we conducted a computer-based lab study, following a common study design in which participants view an artwork, provide ratings, and repeat with a series of stimuli (e.g., Leder et al., 2012). Participants reported on their phenomenal experience with the 16-item measure from Miller et al. (2025 [2.2]), as well as common aesthetic appraisals and impact measures (e.g., liking, meaningfulness, hedonic wellbeing). We first assessed baseline differences between the two settings—the lab and the museum—across these secondary measures, in an effort to identify general context effects in the same manner as previous studies. We then applied a CLPA to assign Experience Types to the new phenomenal reports of in-lab experiences and compared ExpType frequency between the in-lab reports to those collected with the same artworks in the museum. Finally, we investigated potential interaction effects between study-setting and ExpType on appraisals and impact measures.

This study was part of a project funded by an Early Career Researcher Micro-Grant from Division 10 of the American Psychological Association. I served as PI of this project and developed the grant application with co-PI Rebekah Rodriguez-Boerwinkle. Alexandra Victoria Alvarez and Matthew Pelowski also acted as co-PIs on the project and contributed to detailed development and conducting of studies once funding was obtained. This funding also supported a second, ongoing study which, while not discussed in detail here, will investigate art experiences in intermediate digital conditions, namely virtual galleries[15]: one immersive, to be experienced using Virtual Reality (VR; stimulus gallery developed by A.V.Alvarez and Adriano Tenore, https://adrianotenore.com/) and one non-immersive, developed in the Open Gallery for Arts Research (OGAR; Rodriguez-Boerwinkle et al., 2023), which offers browser-based customizable galleries specifically for research purposes.

[15] In addition to explicit virtual galleries (Cheng et al., 2024; Cotter et al., 2022, 2023; Darda et al., 2025; Rodriguez-Boerwinkle & Silvia, 2024; Zhang et al., 2023), recent years have seen increased interest in aesthetic experiences, in and out of the museum, mediated by VR and with other digital technologies more broadly (Lee & Youn, 2024; Pizzolante et al., 2023; Pizzolante & Chirico, 2022; Wu & Oktrova, 2024; Xu et al., 2025; Zhou & Li, 2024, 2024). As such research continues, it is important to establish what the immersive digital environment of VR does on its own, compared to comparable non-immersive digital environments. This is the primary aim of the second, ongoing study.

Miller, S. L.*, Alvarez, A. V.*, Rodriguez-Boerwinkle, R., Pelowski, M. (2025). *From the gallery to the lab: Phenomenal art experience across contexts.* [Manuscript in preparation].

*co-first authors

Contributions:

RRB and I conceptualized the project and obtained funding, with support from AVA and MP. All authors developed and designed the study methods. AVA and I collected the data, and I conducted the data analysis. AVA and I are currently drafting the initial manuscript, and all authors will provide feedback in advance of submission. Manuscript submission is planned for a Research Topic in Frontiers Psychology (New Research in Psychology of Aesthetics, Creativity and the Arts); this Research Topic is associated with the annual meeting of Division 10 of the American Psychological Association (New Haven, CT; March 2025), where SLM and AVA presented preliminary results of the project. The forthcoming VR project will be presented in a separate publication.

Methods and Materials.

The in-lab group, newly recruited for this study, included 113 participants (82/72.3% female; M_{age} = 28.3, *SD* = 8.22). Participants reported, on average, general liking (*M* = 7.72, *SD* = 1.97) and knowledge of art (*M* = 4.79, *SD* = 2.24) at levels comparable to previous museum studies (Miller et al., 2024, 2025; Pelowski et al., 2017a). All participants viewed the same eight stimulus artworks, resulting in a total of *N* = 904 reported art experiences. A non-student population was recruited[16], as to be most comparable to the museum population of Miller et al. (2025). Participants were compensated 10eur. for their time. The study followed all protocols of the ethics board of the University of Vienna.

We identified eight paintings from the original artwork set from Miller et al. (2025) which showed reasonable variety in both visual style and Experience Type frequency: Basquiat, Katz, Kupka, Magritte, Miro, Monet, Rothko, Troger (see Fig. 4 of Miller et al., 2025). These were selected as stimuli for the in-lab study, the procedure for which was guided by previous studies in which participants rated multiple artworks on a desktop computer in a lab environment (Leder et al., 2012). Importantly, the artworks in this case

[16] All participants were recruited via the Study Participant Platform of the Vienna Cognitive Science Hub, which uses the hroot software (Bock et al., 2014).

were not presented in a gallery-like manner, nor was the study experience framed as a visit to a virtual gallery in any way. Participants completed a brief pre-questionnaire (including demographics, etc.) before beginning the art-viewing block. Each participant viewed all eight artworks, in a randomized order. After viewing each artwork, they completed a series of questions about their experience of that specific work, including the 16-item measure of phenomenal experience and a set of aesthetic appraisals and impact measures (matched to Miller et al., 2025). A brief post-viewing measure assessed participants' overall experience of and if/how they perceived their experience in the study to be similar or different than those they have had in museums.

The comparative museum dataset, subset from Miller et al. (2025), included n = 743 participants across the same eight artworks (M_{artwork} = 93, range = 79-111). Compared to the in-lab group, this in-museum population was more balanced for gender and slightly older (429/57.7% female; M_{age} = 34.6, SD = 15.3); however, they reported similar levels of general liking (M = 8.08, SD = 1.69) and knowledge of art (M = 5.00, SD = 2.10). These participants were convenience sampled from museum visitors and participated for no compensation.

Preliminary Results and Discussion.

Results of two-sided t-tests directly comparing participant ratings of aesthetic appraisals and impact measures between the digital and museum experiences are shown in Appendix 3 Table 1; aesthetic judgement ratings between the two settings are also shown in Fig. 1. A majority of variables showed a significant difference between settings; specifically, ratings across variables were lower in the lab than in the museum. This finding is in line with previous work, suggesting that experiences in the lab are less liked, less intense, and less impactful (Darda et al., 2025; Specker et al., 2017); Cohen's D values for significant comparisons reveal negligible to small effect sizes for all comparisons (values ranged -0.118 to -0.368), again replicating previous findings.

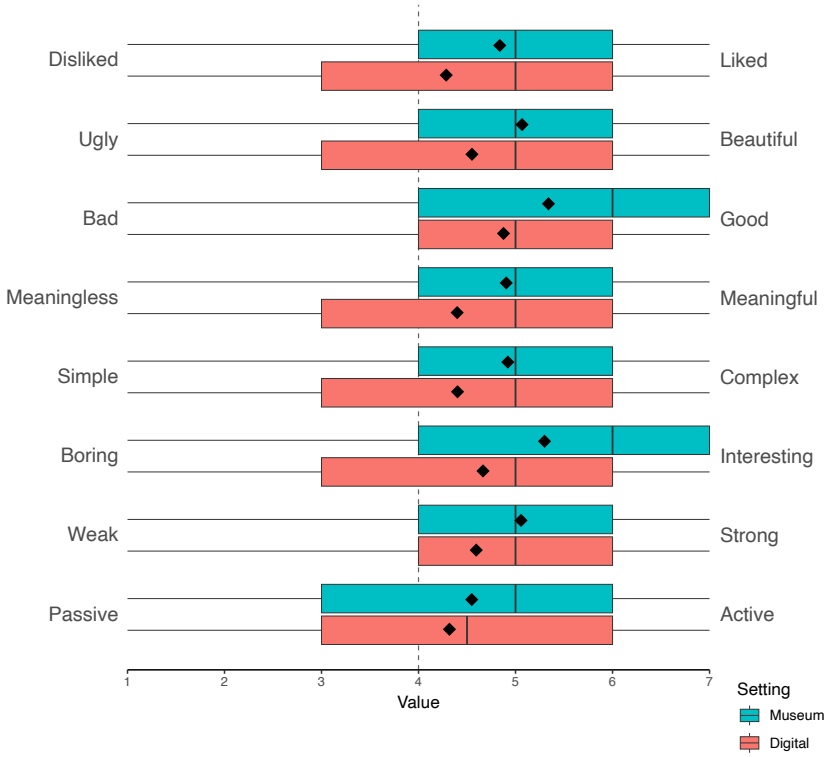


Fig. 1. Aesthetic judgement ratings compared between museum and digital art experiences. Two-sided t-tests for all visualized variables, except for 'activity', showed ratings of museum experiences to be significantly higher than those of digital experiences. Cohen's *D* values for significant variables show small to moderate effects, with values ranging from 0.292 to 0.368 (n_{museum} = 745, $n_{digital}$ = 904).

We applied a CLPA in Mplus 8 (L. K. Muthén & Muthén, n.d.) based on the latent profile model of Miller et al. (2025) to the phenomenal reports of participants' experiences in the lab setting; the analysis showed good differentiation of profiles (entropy = 0.888) and high confidence in ExpType assignments (M_{ALCPP} = 0.924, range = 0.895-0.945). The distribution of ExpTypes in the lab experiences is shown in Fig. 2. There further was no effect of viewing order on ExpType in the lab-based experiences (χ^2_{28} = 36.585, p = 0.1283).

Fig. 2 also shows a comparison of the in-lab ExpType distribution to the distribution of in-museum ExpTypes (summed across the eight selected artworks). A chi-squared analysis did reveal a significant difference in ExpType distribution between the two datasets (χ^2_4 = 11.329, p = 0.0231), while a Cramer's *V* of 0.083 suggests only a weak association between setting and ExpType. In general, there is a small shift (± 2-3%) from Negative to Disengaged experiences in the lab (i.e., lower rate of Negative, higher of

Disengaged), as well as a slightly larger shift (± 4-5%) from Harmonious to Novel experiences (i.e., lower rate of Harmonious, higher Novel); there was no notable change in the rate of Transformative experiences.

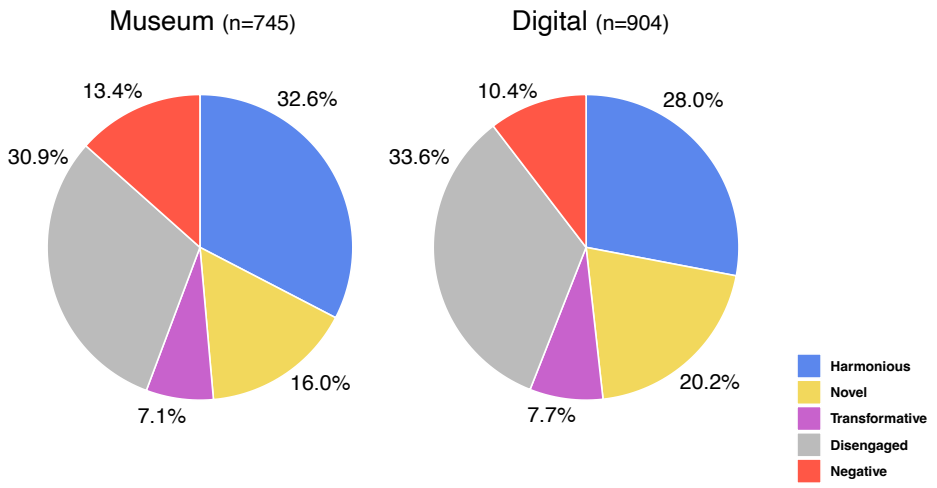


Fig. 2. Distribution of reported Experience Types in museum and digital art experiences. Chi-squared analysis revealed a weak but significant difference in Experience Type distribution between experiences reported in the museum and digital experiences reported in the laboratory.

We next conducted a series of two-way ANOVAs, now including both setting and Experience Type as predictors, with the various aesthetic judgement and impact ratings as dependent variables (Appendix 3 Table 2). While results vary slightly across variables, in general, main effects of setting replicate from the initial comparison of in-lab and in-museum ratings (Fig. 1). We also see significant a significant main effect of ExpType across all variables, and this effect is usually stronger and/or more highly significant than the main effect of setting. Further, there is a significant interaction between setting and ExpType for a number of judgement variables, indicating that the effect of setting varies for the different Experience Types (A3 Table 2) Select variables that showed a significant interaction effect are shown in Fig. 3. Pairwise comparisons largely reveal that the significant effect of setting remained primarily for the Negative ExpType group and occasionally the Disengaged and Transformative groups. The Harmonious and Novel groups show little to no difference in ratings between the museum and lab settings.

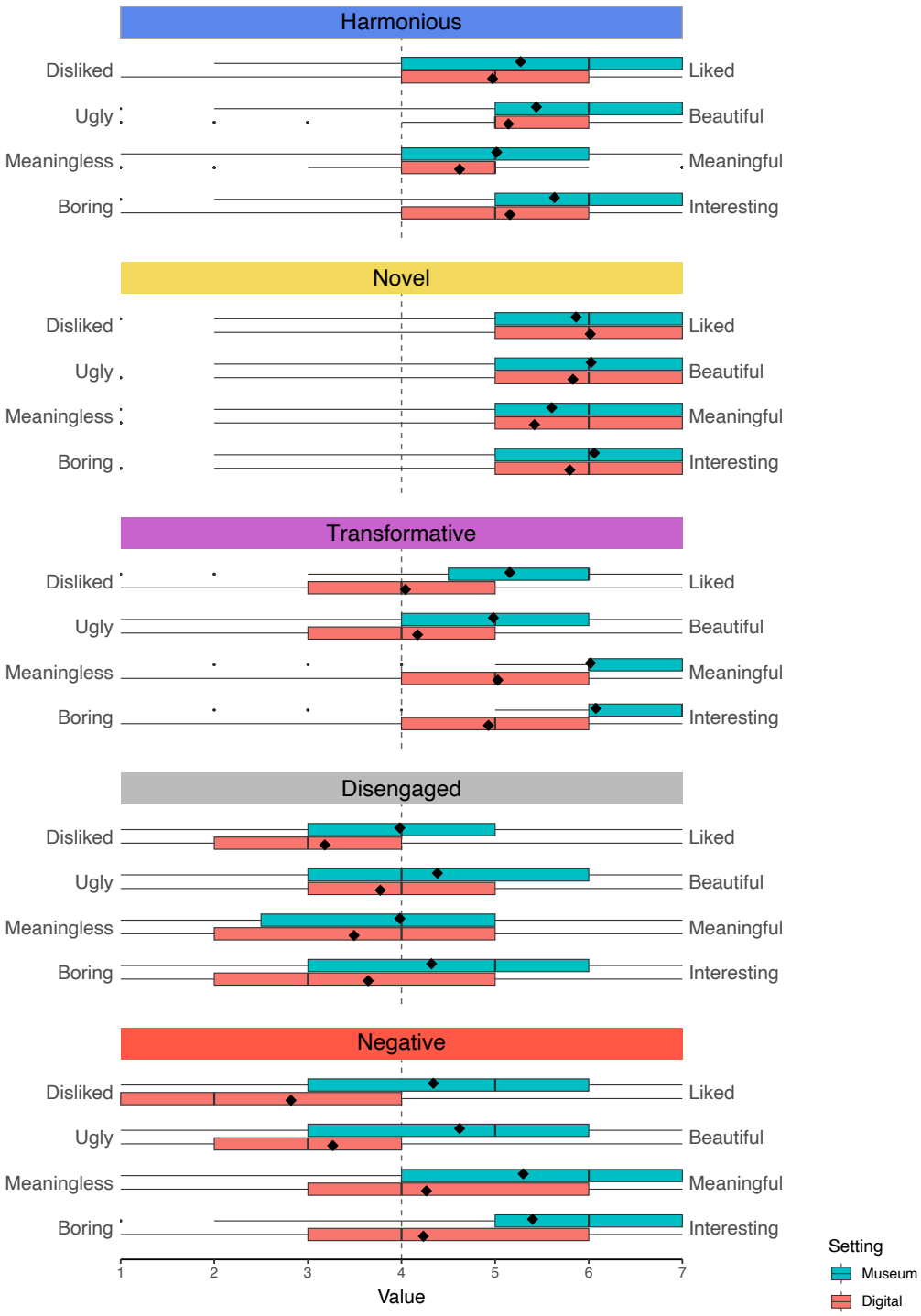


Fig. 3. Ratings of select aesthetic judgements across reported Experience Types, compared between museum and digital art experiences. Two-way ANOVAs revealed a significant interaction between experience setting (museum vs. digital) and reported Experience Type on ratings of common aesthetic judgements. Select variables which showed such an interaction are visualized here. Pairwise comparisons (of visualized variables) for Harmonious experiences revealed a significant contextual effect only on ratings of interest. Ratings did not differ between settings

in Novel experiences, for any variables. Transformative experiences were rated as significantly more liked and meaningful in the museum setting. Significant context effects were observed for all four variables for both the Disengaged and Negative experiences; again, ratings were significantly higher in the museum.

Discussion.

Beyond replicating previous results of lower aesthetic ratings in the lab than the museum, the novel finding that ratings of artworks that were experiences as Negative were most affected/reduced by setting, along with the lower frequency of Negative ExpTypes in the lab, is possibly indicative of a kind of distancing effect, where it may be easier to not engage with a Negative experience in the digital context of the lab (increased distancing effect, where the museum experience may be unavoidably confrontational; Menninghaus et al., 2017; Pelowski et al., 2017b). Else, participants having a Negative experience in the museum may feel pressured to still 'try' to have, or at least report, a more positive experience, as a by-product of cultural expectations placed on museum engagement.

These preliminary findings further demonstrate the value of using the measure of phenomenal experience and applying the ExpType framework to further research questions. Here, by investigating the variance in the effect of context on reported phenomenal experience, we uncovered an interaction effect which could not have been found by only assessing appraisals/judgements or correlating appraisal ratings to ratings of specific emotions/valence/arousal. The observed interaction effect may also contribute to the low effect sizes observed in our initial comparisons and those conducted in previous studies (see Specker, Fekete, et al., 2021a for a recent meta-analysis).

We will continue to investigate this interaction between setting and ExpType, as well as any potential artwork-specific effects, as we further develop this manuscript. The second study of virtual galleries will also provide additional insights, as we examine whether this effect on Negative experiences is replicated in the immersive and/or non-immersive virtual gallery contexts.

4. General Discussion.

4.1. Identifying and Characterizing Shared Art Experience Types.

Through two empirical museum studies, this thesis addresses the emergent need for a systematic, comprehensive assessment of the nature, scope, and variety of possible experiences with (visual) art. We approach this need by focusing on the reported phenomenal experience of individual participants' one on one meetings with single artworks in museums and examining these reports for common patterns that may reflect specific experiential outcomes.

An initial museum study laid the groundwork for our methodological and analytical approach by articulating the theoretical foundation and demonstrating its effectiveness through preliminary results of a smaller-scale, but informative, collection of experiences (Miller et al., 2024 [2.1]). We expanded on this foundation in a much broader investigation of museum visitors' reported phenomenal experiences of specific works of visual art, including over 2,747 participant responses across 31 artworks 11 institutions (Miller et al., 2025 [2.2]). Participant self-reports consisted of 90 potentially-experienced phenomenal states and over 20 secondary ratings of aesthetic judgements and the impacts of viewers' experience. The combination of experiential reports—via hierarchical exploratory graph analysis—revealed 10 communities or clusters of items, including states associated with, for example, aesthetic appreciation, levity, embodiment, connection to others, and alienation. A higher-order structure consolidated these communities into three, reflecting aspects of positive affect, negative affect, and notably, metacognition/reflection.

By applying latent profile analysis to a set of core phenomenal items that effectively capture the nuances of the combined reports, we identified five common patterns of reported art experience, or Experience Types—Harmonious, Novel, Transformative, Disengaged, and Negative. These outcomes broadly aligned with presented theories (Pelowski et al., 2017b) and preliminary empirical results (Miller et al., 2024 [2.1]). Beyond the Disengaged profile, which showed low rating across all items except 'boredom,' results revealed that participant tended to report moderate to high levels positive or negative affect alone—the Harmonious and Negative types—or one set of affective states with high rating of metacognitive terms—reported metacognitive states with positive affect denoted

a Novel experience, while metacognitive and negative states indicated a Transformative experience. These profiles can be thought of as reflecting discrete and psychologically generalizable varieties of experience, grounded in nuanced reports of lived, phenomenal experience.

Further analysis of the ExpType groups showed differing associations with aesthetic judgements and impact measures. In particular, the varied relationship of profiles to ratings of liking and meaningfulness—e.g., Novel and Harmonious relationships are the most liked, but Novel experiences are rated as significantly more meaningful than Harmonious ones—provides support for emerging indications that these two evaluations play unique roles in shaping or indicating the impacts of an art experience (Trupp et al., 2025a, 2025a). Associations of the ExpTypes with impact measures also challenge theories that enhanced wellbeing and transformative change may be mutually exclusive, or at least rarely co-occurrent (Pelowski et al., 2017b; Pizzolante et al., 2024; Sherman & Morrissey, 2017), as the Novel profile was linked with the highest ratings of feeling better, feeling like a better person, and feeling changed. Findings further highlight the potentially critical role of self-relevance in driving desired impacts of art experience (Pelowski et al., 2017b; Tay et al., 2018; Vessel et al., 2023).

Our success in identifying these specific profiles has immediate conceptual and practical implications (see Extensions and Applications below). At the same time, the VIMAP, as the theoretical foundation of our empirical approach to understanding the nature and variety of art experience, does not only posit specific outcomes, but also cognitive processes and mechanisms by which the outcomes may be arrived at (Pelowski et al., 2017b; Pelowski, Miller et al., 2025 [3.2]). Additional work should be done to investigate the (cognitive) processes and mechanisms underlying each of the identified ExpTypes, the potential progression of ExpTypes over the course of an arts encounter, and the acute and cumulative impacts of the different outcomes. Future studies may consider integrating the quantitative method provided by the short, 16-item measure with other (qualitative) methods (e.g., a talk-aloud procedure during art-viewing, interviews, or facilitated discussions after viewing; Bauer & Schwan, 2018; Bell, 2020; Igdalova, Nawaz, et al., 2025; Nielsen et al., 2002) or having participants complete the measure repeatedly, at

set time points during an experience (e.g., 30 sec., 2 min., 5 min., 10 min.; Pelowski et al., 2017b; Tinio et al., 2014).

Beyond the scope of this dissertation, I am planning to work further with the 16-item list and LPA results to more formally validate the use of this measure as an assessment tool. This will include verification that the original network structure is stable across artworks and refinement of the CLPA methods and interpretation. I am also preparing to make the dataset collected and reported on in Miller et al. (2025 [2.2]) publicly available. This dataset, with 2,747 unique participant responses, represents, to the best of my knowledge, the largest collection of nuanced, phenomenal museum experiences and associated evaluations, at the level of individual participant engagements with a specific artwork. It is my hope that this extensive dataset may serve as a resource for researchers looking to investigate a wide range of questions surrounding our perception and experience of the arts in museums.

4.2. Extensions and Applications.

Building on these core findings, I next demonstrated the application of the established ExpType framework to future investigations through additional empirical and theoretical work. In a short report of an ongoing study of viewer characteristics in relation to reported ExpType, significant groupwise differences present across measures that primarily affect the way in which an individual approaches an engagement—namely, trait aesthetic responsiveness, motivations for visiting the museum, and experienced facets of immersion—highlight the critical effect of intention and willingness to engage in shaping experience [3.1].

A theoretical contribution revisits the VIMAP model in light of new empirical findings of identifiable, shared profiles in reported art experience that largely align with the modelled outcomes (Pelowksi, Miller, et al., 2025 [3.2]). We go on to reflect on ongoing discussions surrounding the potential implications and impacts of arts engagement, specifically around wellbeing and mental health, and societal challenges and transformation. Our perspective positions the defined ExpType framework as a starting point for considering wellbeing and transformative impacts from a more comprehensive, experience-centered place. To address some of the points raised in this review, it would be

valuable to pair the ExpType assessment with pre- and post-assessments, investigate the potentially compounding effects of repeated arts encounters, and assess impacts on an exhibition, rather than artwork, level. Future work should also specifically investigate the relationship *between* positive wellbeing and transformation, as we unexpectedly found the Novel experience type to be associated with reports of feeling better and changed (Miller et al., 2025 [2.2]; Pelowski, Miller et al., 2025 [3.2]).

Through reporting on a first museum study of phenomenal art experience utilizing fNIRS, I next exhibited the promising application of the identified five-profile LPA model (Miller et al., 2025 [2.2]) to independently collected datasets via CLPA with deterministic constraints [3.3.1]. The conducted CLPA successfully matched new participant reports to the existing profiles with high group discrimination and high confidence in individual assignments. In the context of the described fNIRS study, this application will enable my colleagues and I to investigate the potential neural correlates of art experience in a groupwise manner that can account for the specific type of experience individual participants reported having.

In a second application, I described a comparative study of genuine experiences in the museum to experiences of digital replicas of the same artworks in the laboratory [3.3.2]. Initially, we found similar effects of setting to previous studies, specifically that artwork ratings were significantly lower in the lab across measures (Darda et al., 2025; Grüner et al., 2019; Specker, Fekete, et al., 2021a). CLPA results showed high confidence in ExpType assignment based on self-reported digital experiences, as with the previous fNIRS study. We then integrated these assignments into analyses of setting and found significant interaction effects across a number of ratings, including liking, beauty, meaningfulness, and interest. These interaction effects revealed significant variance in the effects of context between the ExpType groups, specifically that profiles characterized by positive affect—Harmonious and Novel—showed little to no change in ratings between contexts. Negative, Disengaged, and Transformative experiences, however, were associated with significantly lower ratings in the laboratory than the museum. Further analysis is required to determine what underlying mechanisms might be causing this effect, but by applying the ExpType measure and framework to this assessment of context, we identified a highly relevant,

significant interaction between context and felt experience that may have been obscured in previous investigations (Pelowski et al., 2017a; Specker, Fekete, et al., 2021a).

As demonstrated through these projects, the presented methodology provides us the opportunity to apply the ExpType framework to other types of stimuli and additional research questions. Colleagues and I have continued to apply the 16-item measure in additional studies that fell outside the scope of this thesis, including assessments of murals and public artworks, experiences of nature (in comparison to experiences of a SkySpace by James Turrell; Pistolas, Miller, et al., [Manuscript in preparation])[17], and even other cultural events, such as a football match. In all these cases, preliminary CLPAs have been successful in matching new participant reports to the ExpType profiles, at acceptable to high confidence levels. The distribution of ExpTypes continues to vary across stimuli and datasets, but the occurrence and character of the profiles remains stable, providing additional support for the commonality of the identified varieties of experience. I will continue to apply this measure and investigate the generalizability of the Experience Types identified here to other types of stimuli (e.g., theatre and performance).

In the future, we may also look to other features of an engagement, outside the type of stimulus, environment, or context in which a stimulus is engaged. This could include assessing the effects of providing additional information (artwork title, biographical information about the artist, contextual information about the artwork style or intention; Anglada-Tort et al., 2018; Gerger & Leder, 2015; Igdalova & Chamberlain, 2025), advance training or guided tours on how to approach or process an artwork (slow-looking, open-mindedness; Brida et al., 2016; Igdalova, Humphries, et al., 2025; Mastandrea et al., 2007). In collaborative and co-created studies, we may explore the influence of curation on reported experiences, build on previous work about how curator or artist-intended emotions correspond to participant-reported experiences (Demmer et al., 2023; Pelowski et al., 2020, 2023), and assess our ability to intentionally design arts-encounters for a specific outcome (Pelowski, Marengo, et al., 2025).

[17] This study also included pre-/post-assessments of wellbeing by measure of mood, life satisfaction, sense of meaning in life, felt connection to self/community/nature, stress, and anxiety.

4.3. Conclusion.

In this dissertation, I set out to systematically investigate the nature, scope, and variety of experiences we may have with visual art in museums, focusing throughout on the phenomenal and felt aspects of experience. We successfully identified five latent profiles within participant reports, which reflect discrete, shared types of art experience and differentially map onto aesthetic judgements and impact measures. These profiles—Harmonious, Novel, Transformative, Disengaged, and Negative—were demonstrated to have applications to assessments of felt experience, influential viewer and contextual features, the manifestation of experience in the brain, and the profound individual and societal impacts that engagement with the arts can have. Beyond the immediate applications of findings to the arts and aesthetics, this thesis puts forward a unique and necessary perspective to how empirical aesthetics, psychology, and the cognitive sciences approach far-reaching questions of art and human experience.

While some have argued that our experience of the arts—or by extension, any complex human phenomena—is too complicated, nuanced, and varied to effectively study (Shusterman, 2000; Vygotsky, 1974), my work here revealed shared but phenomenologically distinct varieties of art experience, which also were—and through applications of the defined experiential framework, continue to be—quantitatively identifiable and measurable (Miller et al., 2025 [2.2]). There is, of course, going to be some variance within the felt experience of individuals who reported the same Experience Type (Pelowski et al., 2017b), but this variance does not negate the commonalities within each group, which, likely, arise from shared facets of the cognition underlying our perception of and engagement with the arts (Baltissen & Ostermann, 1998; Chatterjee & Vartanian, 2014; Jagodzinski, 1981; Leder & Nadal, 2014; Pelowski et al., 2017b). These findings challenge reductive accounts that disregard lived experience, by demonstrating subjective, phenomenal reports to be a valuable source of intuited and embodied knowledge and support claims that lived experiences have intrinsic value and function (Cleeremans & Tallon-Baudry, 2022). It is not the case that our unique phenomenal experiences with art are too complicated to study directly—or too convoluted to account for when focusing on specific features or impacts of arts engagement—it is that simply our extant methods have

been limited in their capacity to comprehensively assess and integrate these nuances.This dissertation offers a novel approach to art experience that not only accounts for, but centers phenomenal experience and confidently establishes a framework, systematically grounded in both theory and data, for describing the nuanced, varied, and yet shared, ways in which we experience the arts.

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6. Thesis Abstracts.

6.1. English.

This dissertation investigates the broad nature and scope of experiences that people have with visual artworks, by considering what such experiences feel like, and asking if there are shared patterns to the ways in which we experience art. I first present two museum studies, in which in-depth self-reports of emotional-phenomenal art experience were collected from museum visitors; data were then analyzed via network modelling and latent profile analysis to identify shared response profiles that represent distinct types of experience. The first publication [2.1] outlines the theoretical foundation of our approach and affirms the utility of our methodology through the presentation of initial empirical results. The second publication [2.2] presents an expanded, more robust investigation including a broad range of individuals, artworks, and phenomenal terms; we identify and characterize five recurring Experience Types, according to their phenomenal profiles and relation to common aesthetic judgements and impact measures. I then discuss extensions and applications of this framework, through both empirical studies and theoretical perspectives. In a direct extension of 2.2, we investigate personality and other individual differences in relation to the reported profiles [3.1]. A theoretical publication [3.2] discusses the applications of this approach to investigations of the arts' impact on individual and societal wellbeing and transformation. Finally, we demonstrate the explicit application of the identified Experience Types through short reports of two ongoing empirical studies: through an investigation of art experience in the brain [3.3.1] and a comparison of reported experiences between museum and digital contexts [3.3.2]. By centering and effectively capturing the felt, phenomenal experiences of museum visitors, this dissertation identifies shared patterns in how we experience visual art and offers a novel and innovative framework for studying these experiences.

6.2. German.

Diese Dissertation untersucht die die vielfältige Natur und den Umfang der Erfahrungen, die Menschen mit visuellen Kunstwerken haben, indem sie untersucht, wie sich diese Erfahrungen anfühlen und ob es gemeinsame Muster in der Art und Weise gibt, wie wir Kunst erleben. Zunächst stelle ich zwei Museumsstudien vor, in denen ausführliche Selbstberichte von Museumsbesuchern über emotionale und phänomenale Kunsterfahrungen gesammelt wurden. Die Daten wurden anschließend mittels Netzwerkmodellierung und latenter Profilanalyse ausgewertet, um gemeinsame Reaktionsprofile zu identifizieren, die unterschiedliche Arten von Erfahrungen repräsentieren. Die erste Veröffentlichung [2.1] skizziert die theoretischen Grundlagen unseres Ansatzes und bestätigt die Nützlichkeit unserer Methodik durch die Präsentation erster empirischer Ergebnisse. Die zweite Veröffentlichung [2.2] stellt eine erweiterte und robustere Untersuchung dar, die ein breites Spektrum an Personen, Kunstwerken und phänomenalen Begriffen umfasst. Wir identifizieren und charakterisieren darin fünf wiederkehrende Erfahrungstypen anhand ihrer phänomenalen Profile sowie ihrer Beziehung zu gängigen ästhetischen Bewertungen und Wirkungsmaßen. Im Anschluss diskutiere ich Erweiterungen und Anwendungen dieses Konzepts sowohl auf Basis empirischer Studien als auch aus theoretischer Perspektive. In einer direkten Erweiterung von 2.2 untersuchen wir Persönlichkeit und andere individuelle Unterschiede in Bezug auf die Profile [3.1]. In einer theoretischen Veröffentlichung [3.2] werden die Anwendungen dieses Konzepts für Untersuchungen zum Einfluss von Kunst auf das individuelle und gesellschaftliche Wohlbefinden sowie auf transformative Erfahrungen diskutiert. Schließlich demonstrieren wir die explizite Anwendung der identifizierten Erfahrungstypen anhand zwei kurzer Berichte über laufende empirische Studien: eine Untersuchung der Kunsterfahrung im Gehirn [3.3.1] und ein Vergleich der berichteten Erfahrungen in Museums und digitalen Kontexten [3.3.2]. Indem diese Dissertation die gefühlten, phänomenalen Erfahrungen von Museumsbesuchern in den Mittelpunkt stellt und effektiv erfasst, identifiziert sie gemeinsame Muster in der Art und Weise, wie wir visuelle Kunst erleben, und bietet einen neuen und innovativen Rahmen für die Untersuchung solcher Erfahrungen.

7. Appendix.

Appendix 1. Individual Differences [3.1].

Table 1. Descriptive statistics of reported viewer characteristics of Group 1.
(Across the full group, broken down by artwork and by Experience Type).
A. Aesthetic Responsiveness, Big-Five Personality
B. (Political) Ideologies, Immersion

Table 2. Descriptive statistics of reported viewer characteristics of Group 2.
(Across the full group, broken down by artwork and by Experience Type).
A. Aesthetic Responsiveness, Big-Five Personality
B. (Political) Ideologies, Immersion

Table 3. Differences in viewer characteristics across Experience Types (Group 1).

Table 4. Differences in viewer characteristics across Experience Types (Group 2).

Appendix 2. Digital Art Experiences [3.3.2].

Table 1. Comparison of aesthetic judgement and impact ratings between digital and museum art experiences.

Table 2. Aesthetic ratings between museum and digital experiences and Experience Type groups.

Appendix 1. Individual Differences [3.1].

A1. Table 1. Descriptive statistics of reported viewer characteristics of Group 1.
(Across the full group, broken down by artwork and by Experience Type).

A.

		Aesthetic Responsiveness								***Personality***									
Group	*n*	*Total*		*Aesthetic Appreciation*		*Intense Aesthetic Experience*		*Creative Behavior*		*Extraversion*		*Agreeableness*		*Conscientiousness*		*Negative Emotionality*		*Open-Mindedness*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
Total:	1,023	2.18	0.62	2.80	0.61	1.73	0.84	1.19	1.04	3.26	0.82	3.71	0.74	3.48	0.85	2.95	1.00	3.86	0.68
By Artwork:																			
Albert	92	2.18	0.64	2.80	0.60	1.70	0.83	1.16	1.03	3.28	0.76	3.77	0.68	3.49	0.86	2.91	0.99	3.85	0.67
Basquiat	83	2.41	0.68	2.99	0.61	2.08	0.86	1.33	1.19	3.22	0.73	3.70	0.62	3.49	0.79	3.05	0.93	3.96	0.71
Delaunay	84	2.29	0.62	2.91	0.57	1.78	0.94	1.41	1.02	3.30	0.85	3.83	0.69	3.47	0.92	3.03	1.05	4.02	0.65
Kupka	88	2.16	0.65	2.77	0.62	1.63	0.86	1.23	1.03	3.25	0.90	3.66	0.83	3.34	0.85	2.92	0.95	3.84	0.71
Magritte	110	2.15	0.57	2.69	0.57	1.67	0.74	1.35	1.05	3.17	0.80	3.57	0.70	3.41	0.79	3.11	1.09	3.81	0.69
Marc	76	2.18	0.62	2.84	0.61	1.76	0.86	1.01	0.91	3.39	0.78	3.58	0.80	3.47	0.84	2.94	1.01	3.78	0.69
Miro	100	2.10	0.61	2.71	0.63	1.58	0.75	1.15	1.01	3.19	0.83	3.75	0.71	3.47	0.85	2.89	0.99	3.86	0.66
Monet	95	2.19	0.58	2.85	0.51	1.79	0.81	1.01	0.99	3.18	0.83	3.89	0.63	3.53	0.82	2.91	0.99	3.93	0.71
Muntean-Rosenblum	93	2.13	0.62	2.71	0.61	1.68	0.75	1.16	1.08	3.34	0.78	3.60	0.76	3.57	0.87	2.63	0.92	3.88	0.70

Group	n	***Aesthetic Responsiveness***								***Personality***									
		Total		*Aesthetic Appreciation*		*Intense Aesthetic Experience*		*Creative Behavior*		*Extraversion*		*Agreeableness*		*Conscientiousness*		*Negative Emotionality*		*Open-Mindedness*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
Picasso	111	2.05	0.61	2.69	0.66	1.65	0.81	0.89	0.86	3.26	0.85	3.71	0.81	3.59	0.84	2.95	1.04	3.73	0.65
Renoir	91	2.27	0.65	2.86	0.62	1.76	0.99	1.39	1.19	3.30	0.89	3.73	0.82	3.40	0.88	3.08	0.98	3.86	0.68
By Experience Type:																			
Harmonious	374	2.14	0.59	2.80	0.58	1.65	0.79	1.05	1.03	3.27	0.81	3.77	0.70	3.51	0.85	2.88	0.95	3.86	0.68
Novel	160	2.47	0.60	3.08	0.59	2.16	0.79	1.37	1.06	3.22	0.81	3.89	0.74	3.42	0.89	2.89	1.04	3.91	0.71
Transformative	63	2.49	0.53	2.97	0.54	2.24	0.76	1.61	1.00	3.38	0.81	3.67	0.72	3.33	0.77	3.16	0.97	3.97	0.68
Disengaged	317	2.02	0.65	2.62	0.63	1.45	0.84	1.19	1.06	3.22	0.85	3.58	0.74	3.51	0.85	2.94	1.04	3.80	0.69
Negative	109	2.22	0.53	2.80	0.53	1.87	0.76	1.15	0.92	3.29	0.80	3.61	0.79	3.43	0.78	3.15	1.00	3.92	0.61

Note. Aesthetic responsiveness traits were scored on a scale of 0 – 4. Personality traits were scored on a scale of 1 – 5.

A1. Table 1. Descriptive statistics of reported viewer characteristics of Group 1.
(Across the full group, broken down by artwork and by Experience Type).

B.

Group	*n*	***(Political) Ideologies***								***Immersion***									
		Fiscal		*Social*		*Religiosity*		*Spirituality*		*General*		*Captivation*		*Real-world Disassociation*		*Comprehension*		*Transportation*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
Total	1,023	4.94	1.43	5.37	1.42	2.41	1.64	3.52	1.82	5.11	2.73	5.79	2.78	5.20	2.86	6.02	2.66	4.37	2.91
By Artwork:																			
Albert	92	4.83	1.50	5.26	1.57	2.57	1.63	3.51	1.71	3.52	2.49	4.02	2.77	4.83	2.94	6.47	2.55	3.28	2.95
Basquiat	83	5.05	1.36	5.54	1.29	2.60	1.64	3.30	1.64	5.37	2.60	6.70	2.53	5.05	2.86	6.33	2.58	4.84	2.94
Delaunay	84	4.43	1.52	5.26	1.46	2.16	1.37	3.76	1.80	4.35	2.91	4.93	3.24	5.93	2.84	6.65	2.65	3.79	2.89
Kupka	88	5.14	1.32	5.40	1.54	2.19	1.61	3.39	1.77	5.23	2.42	5.65	2.60	5.59	2.87	5.12	2.57	4.17	2.91
Magritte	110	4.93	1.48	5.13	1.50	2.50	1.68	3.45	1.95	4.94	2.85	5.48	3.05	4.73	2.99	4.34	2.61	3.84	2.69
Marc	76	4.83	1.56	5.27	1.37	2.28	1.55	3.62	1.85	5.51	2.78	5.88	2.62	5.17	2.94	5.95	2.53	4.76	3.04
Miro	100	5.08	1.37	5.59	1.27	2.41	1.69	3.61	1.82	4.98	2.86	5.91	2.87	4.68	3.01	4.98	2.75	3.72	2.82
Monet	95	4.93	1.54	5.30	1.46	2.52	1.68	3.53	1.73	5.35	2.49	6.34	2.47	5.27	2.68	6.76	2.42	4.86	2.75
Muntean-Rosenblum	93	4.84	1.29	5.30	1.46	2.32	1.69	3.51	1.86	5.41	2.85	6.30	2.74	5.08	2.66	6.90	2.22	4.88	2.88
Picasso	111	4.90	1.45	5.39	1.36	2.29	1.64	3.37	1.88	5.64	2.35	6.38	2.30	5.49	2.73	6.07	2.47	4.43	2.74
Renoir	91	5.35	1.28	5.64	1.33	2.61	1.79	3.79	1.99	5.87	2.72	6.08	2.40	5.57	2.81	7.03	2.36	5.61	2.79

Group	n	***(Political) Ideologies***								***Immersion***									
		Fiscal		*Social*		*Religiosity*		*Spirituality*		*General*		*Captivation*		*Real-world Disassociation*		*Comprehension*		*Transportation*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
By Experience Type:																			
Harmonious	374	5.00	1.37	5.39	1.44	2.32	1.59	3.35	1.75	5.64	2.37	6.43	2.34	5.13	2.77	6.23	2.44	4.83	2.74
Novel	160	5.01	1.50	5.25	1.47	2.75	1.74	4.04	1.84	7.04	2.10	7.66	1.94	5.48	2.67	6.65	2.46	6.23	2.41
Transformative	63	5.00	1.46	5.27	1.47	2.97	1.60	3.98	1.67	6.37	1.98	6.71	2.25	5.49	2.05	6.24	2.06	6.19	2.22
Disengaged	317	4.80	1.46	5.40	1.42	2.26	1.63	3.41	1.92	3.31	2.53	3.85	2.73	5.08	3.18	5.48	3.02	2.62	2.63
Negative	109	5.03	1.45	5.46	1.31	2.31	1.59	3.46	1.69	4.94	2.57	5.94	2.48	5.23	2.88	5.78	2.56	4.03	2.34

Note. Ideologies were rated on a scale of 1 – 7. Immersion was rated on a scale of 0 – 10.

A1. Table 2. Descriptive statistics of reported viewer characteristics of Group 2.
(Across the full group, broken down by artwork and by Experience Type).

A.

Group	*n*	***Visit Motivations***																							
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*		*11*		*12*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
Total:	843	5.29	1.54	4.35	1.65	4.18	1.92	5.44	1.52	4.50	1.94	4.95	1.67	4.88	1.72	3.65	2.36	6.00	1.23	4.85	1.71	5.40	1.52	5.34	1.57
By Artwork:																									
Faust	60	4.86	1.68	4.19	1.69	4.54	1.97	5.42	1.56	4.84	2.03	4.65	1.82	4.65	1.76	3.56	1.99	5.93	1.44	5.23	1.51	4.96	1.48	5.58	1.48
Kapoor	81	5.28	1.61	4.21	1.43	4.12	1.91	5.05	1.48	4.47	2.00	5.00	1.56	4.61	1.76	3.68	2.05	5.95	1.15	4.52	1.90	5.51	1.66	4.96	1.65
Katz	99	5.01	1.72	4.08	1.64	4.13	1.95	5.10	1.67	4.48	1.92	4.64	1.80	4.48	1.94	3.60	1.94	5.92	1.36	4.72	1.73	5.30	1.54	5.38	1.60
Kollwitz	44	5.47	1.50	4.70	1.70	3.88	1.89	6.09	1.17	4.49	1.75	5.52	1.37	5.62	1.29	4.95	6.37	6.21	0.99	4.77	1.65	5.16	1.57	5.44	1.50
Nitsch	97	5.49	1.39	4.15	1.55	3.85	1.88	5.58	1.22	4.60	2.01	5.01	1.53	4.87	1.79	3.18	1.72	6.07	1.06	4.74	1.73	5.40	1.64	5.38	1.60
Rego	45	5.00	1.51	4.08	1.58	4.36	2.02	5.55	1.31	4.57	1.86	4.55	1.67	4.64	1.64	3.76	1.66	5.98	1.05	4.83	1.53	5.21	1.32	5.69	1.35
Schönn	87	4.98	1.78	4.53	1.83	4.40	1.92	5.01	1.81	4.80	1.84	4.62	1.98	4.83	1.97	3.80	2.04	5.89	1.53	5.31	1.70	5.20	1.73	5.29	1.72
Smith	84	5.60	1.31	4.44	1.72	3.91	1.94	5.71	1.44	4.52	1.93	5.26	1.56	4.94	1.66	3.55	1.95	6.00	1.19	4.86	1.72	5.62	1.30	5.22	1.59
Troger	79	5.14	1.30	4.52	1.65	4.05	1.95	5.58	1.22	4.52	1.80	4.97	1.53	4.99	1.61	3.49	1.71	6.00	1.20	5.01	1.55	5.66	1.41	5.71	1.42
Turrell	77	5.55	1.36	4.52	1.75	4.66	1.83	5.43	1.70	4.30	2.04	4.88	1.75	4.97	1.55	3.57	1.83	6.03	1.14	4.66	1.67	5.60	1.46	5.25	1.62
Warhol	90	5.68	1.47	4.52	1.56	4.26	1.84	5.64	1.55	4.07	2.04	5.35	1.54	5.28	1.50	3.66	1.79	6.08	1.19	4.75	1.80	5.52	1.42	5.15	1.47

Group	*n*	***Visit Motivations***																							
		1		*2*		*3*		*4*		*5*		*6*		*7*		*8*		*9*		*10*		*11*		*12*	
		M	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
By Experience Type:																									
Harmonious	237	5.31	1.56	4.26	1.61	4.30	1.89	5.47	1.52	4.34	2.00	4.93	1.63	5.15	1.62	3.49	1.86	6.11	1.17	4.85	1.70	5.40	1.53	5.50	1.49
Novel	119	5.88	1.21	4.94	1.59	4.73	1.90	5.60	1.49	4.51	1.81	5.58	1.43	5.61	1.33	3.87	2.08	6.39	0.93	5.14	1.76	5.91	1.24	5.28	1.73
Transformative	79	5.35	1.25	4.92	1.37	4.45	1.85	5.87	1.15	4.72	1.72	5.33	1.34	5.35	1.44	4.24	1.73	6.05	1.12	4.71	1.50	5.48	1.26	5.15	1.33
Disengaged	274	4.92	1.71	3.94	1.70	3.73	1.88	5.12	1.64	4.56	1.96	4.48	1.85	4.15	1.84	3.42	3.11	5.71	1.40	4.74	1.77	5.15	1.60	5.15	1.68
Negative	134	5.46	1.38	4.45	1.58	4.22	1.95	5.60	1.38	4.53	2.04	5.16	1.50	4.96	1.64	3.80	1.88	6.01	1.11	4.91	1.64	5.43	1.61	5.63	1.40

Note. Visit motivations were rated on a scale of 1 – 7. Rated motivations were as follows: 1) Have my thoughts provoked, 2) Art design to be convincing, 3) Enjoy silence of museum space, 4) Improve understanding of arts, 5) Have a nice time with family/friends, 6) Be part of the art exhibitions with all my senses, 7) Experience deep connection to art, 8) See something familiar which I already know, 9) Experience the beauty of artworks, 10) Be entertained, 11) Be surprised, 12) See famous artworks.

A1. Table 2. Descriptive statistics of reported viewer characteristics of Group 2.
(Across the full group, broken down by artwork, and by Experience Type).

B.

Group	*n*	***Visit Expectations*** *(counts)*							***Personal Values***								***Emotional Capacities***							
									Hedonic		*Egoistic*		*Altruistic*		*Biospheric*		*Reappraisal*		*Suppression*		*Range*		*Differentiation*	
		1	*2*	*3*	*4*	*5*	*6*	*7*	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
Total:	843	80	98	154	19	215	6	215	5.05	1.52	2.93	1.61	5.84	1.56	5.69	1.67	4.87	1.08	3.62	1.41	5.07	0.90	5.54	0.90
By Artwork:																								
Faust	60	4	6	9	2	21	1	17	5.02	1.76	2.84	1.62	5.59	1.97	5.40	1.86	4.80	1.12	3.67	1.31	5.17	0.84	5.64	0.84
Kapoor	81	4	7	14	2	22	2	25	5.05	1.54	2.45	1.66	5.70	1.44	5.79	1.40	4.49	1.04	3.52	1.47	5.06	1.01	5.53	1.01
Katz	99	5	7	15	1	16	0	36	5.14	1.47	3.03	1.51	5.86	1.65	5.62	1.86	4.81	1.09	3.75	1.28	4.86	0.91	5.32	0.91
Kollwitz	44	6	5	3	2	9	0	17	4.99	1.52	3.28	1.89	6.14	1.36	5.68	1.71	4.95	0.94	3.44	1.31	5.19	0.95	5.66	0.95
Nitsch	97	8	18	17	0	20	0	23	5.21	1.22	3.13	1.41	6.07	1.05	5.80	1.31	4.90	1.17	3.58	1.48	5.11	0.94	5.57	0.94
Rego	45	5	3	6	1	12	1	16	4.74	1.57	3.10	1.62	5.81	1.38	6.01	1.34	5.02	1.07	3.66	1.54	4.84	0.92	5.31	0.92
Schönn	87	12	11	22	1	26	0	10	5.04	1.73	3.13	1.68	5.45	2.03	5.26	2.18	5.19	0.95	3.81	1.59	5.14	0.84	5.60	0.84
Smith	84	9	11	14	1	22	1	22	5.16	1.37	2.78	1.34	6.27	1.04	6.23	1.22	4.71	1.18	3.55	1.42	5.18	0.75	5.65	0.75
Troger	79	11	6	16	3	24	1	16	4.76	1.64	3.34	1.81	5.71	1.70	5.76	1.66	5.00	0.95	3.75	1.50	5.08	0.87	5.55	0.87
Turrell	77	5	11	15	4	20	0	16	5.18	1.55	2.76	1.60	5.88	1.34	5.57	1.51	4.85	1.12	3.64	1.15	4.93	0.95	5.39	0.95
Warhol	90	11	13	23	2	23	0	17	5.05	1.47	2.59	1.61	5.78	1.72	5.52	1.85	4.91	1.03	3.44	1.40	5.18	0.88	5.65	0.88

Group	n	***Visit Expectations*** *(counts)*							***Personal Values***								***Emotional Capacities***							
									Hedonic		*Egoistic*		*Altruistic*		*Biospheric*		*Reappraisal*		*Suppression*		*Range*		*Differentiation*	
		1	*2*	*3*	*4*	*5*	*6*	*7*	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd	*M*	sd
By Experience Type:																								
Harmonious	237	21	26	46	6	59	2	59	5.03	1.50	2.78	1.45	5.77	1.56	5.83	1.61	4.99	1.02	3.52	1.42	5.12	0.87	5.59	0.87
Novel	119	10	10	17	3	35	0	34	5.22	1.52	3.23	1.74	5.99	1.40	5.98	1.45	5.03	1.07	3.81	1.55	5.17	0.90	5.63	0.90
Transformative	79	17	9	14	1	20	1	16	4.83	1.53	3.32	1.52	5.73	1.48	5.34	1.69	4.91	0.85	4.25	1.36	5.09	0.74	5.55	0.74
Disengaged	274	18	30	48	7	71	3	75	5.01	1.63	2.80	1.69	5.75	1.82	5.49	1.90	4.70	1.20	3.52	1.25	4.92	0.96	5.39	0.96
Negative	134	14	23	29	2	30	0	31	5.18	1.31	2.97	1.63	6.08	1.08	5.79	1.37	4.83	1.01	3.45	1.48	5.18	0.87	5.64	0.87

Note. Indications of visit expectations are by count (rather than continuous ratings). Options were as follows: 1) To learn something, 2) To see one artwork/exhibit in particular, 3) To see things I have never seen before, 4) To revisit the art, see it again, 5) To see original art in person, 6) To be able to say that I have been to this museum, 7) To have an enjoyable experience. Personal values were rated on a scale of -1 – 7. Emotional capacities (regulation and complexity) were scored on a scale of 1 - 7.

A1. Table 3. Differences in viewer characteristics across Experience Types (Group 1).

Variable	*df*	sumsq	meansq	F	*p*	η^2	Significant pairwise comparisons
Aesthetic Responsiveness							
Total Score	4, 994	27.64	6.91	19.00	< .001***	0.07	All but H/D, H/Ne, No/T
Aesthetic Appreciation	4, 997	24.13	6.03	17.42	< .001***	0.07	All but H/T, H/Ne, No/T, T/Ne
Intense Aesthetic Experience	4, 1006	74.08	18.52	29.09	< .001***	0.10	All but H/Ne, No/T
Creative Behavior	4, 1005	24.00	6.00	5.63	< .001***	0.02	H/No, H/T, T/D, T/Ne
Personality							
Extraversion	4, 979	1.86	0.47	0.69	.596	0.00	
Agreeableness	4, 978	12.56	3.14	5.88	< .001***	0.02	H/D, No/D, No/Ne
Conscientious-ness	4, 979	2.78	0.70	0.97	.421	0.00	
Negative Emotionality	4, 977	8.95	2.24	2.24	.063	0.01	
Open-Mindedness	4, 977	2.53	0.63	1.36	.246	0.01	
(Political) Ideologies							
Fiscal	4, 973	8.71	2.18	1.06	.376	0.00	
Social	4, 982	4.24	1.06	0.52	.720	0.00	
Religiosity	4, 987	47.39	11.85	4.47	.001**	0.02	H/No, H/T, No/D, T/D
Spirituality	4, 985	68.57	17.14	5.25	< .001***	0.02	H/N, No/D

Variable	*df*	sumsq	meansq	F	*p*	η^2	Significant pairwise comparisons
Immersion							
General Immersion	4, 1009	1,814.10	453.52	79.86	< .001***	0.24	All but H/T, H/Ne, No/T
Captivation	4, 1011	1,947.97	486.99	83.23	< .001***	0.25	All but H/T, H/Ne, No/T, T/Ne
Real-World Disassociation	4, 1013	23.72	5.93	0.72	.576	0.00	
Comprehension	4, 1004	178.94	44.74	6.48	< .001***	0.03	H/D, No/D
Transportation	4, 1007	1,797.58	449.39	67.19	< .001***	0.21	All but No/T

Note. Aesthetic responsiveness traits were scored on a scale of 0 – 4. Personality was scored on a scale of 1 – 5. Ideologies were rated on a scale of 1 – 7. Immersion was rated on a scale of 0 – 10. Following Bonferroni correction for multiple comparisons, significance is set at 0.0028 (0.05/18). Pairwise comparisons were conducted via Tukey's HSD between Experience Type groups (H = Harmonious, No = Novel, T = Transformative, D = Disengaged, Ne = Negative).

A1. Table 4. Differences in viewer characteristics across Experience Types (Group 2).

Variable	*df*	sumsq	meansq	statistic	*p*	η^2	Significant pairwise comparisons
Visit Motivations							
Have my thoughts provoked (1)	4, 790	78.13	19.53	8.58	< .001***	0.04	H/N, H/D, No/D, D/Ne
Art design to be convincing (2)	4, 774	108.27	27.07	10.47	< .001***	0.05	H/No, H/T, No/D, T/D, D/Ne
Enjoy silence of museum space (3)	4, 791	93.74	23.44	6.54	< .001***	0.03	H/D, No/D, T/D
Improve understanding of arts (4)	4, 787	46.44	11.61	5.15	< .001***	0.03	H/D, No/D, T/D, D/Ne
Have a nice time with family/friends (5)	4, 789	10.03	2.51	0.67	.616	0.00	
Be part of the art exhibitions with all my senses (6)	4, 789	119.40	29.85	11.19	< .001***	0.05	H/No, H/D, No/D, T/D, D/Ne
Experience deep connection to art (7)	4, 787	228.38	57.10	21.15	< .001***	0.10	H/D, No/D, T/D, D/Ne
See something familiar which I already know (8)	4, 791	54.89	13.72	2.48	.042*	0.01	
Experience the beauty of artworks (9)	4, 790	41.73	10.43	7.17	< .001***	0.04	H/D, No/D
Be entertained (10)	4, 790	14.95	3.74	1.29	.274	0.01	
Be surprised (11)	4, 791	46.60	11.65	5.14	< .001***	0.03	H/N, No/D
See famous artworks (12)	4, 787	28.08	7.02	2.89	.022*	0.01	
Personal Values							
Hedonic	4, 804	9.71	2.43	1.05	.381	0.01	
Egoistic	4, 802	32.01	8.00	3.10	.015*	0.02	
Altruistic	4, 800	14.11	3.53	1.46	.214	0.01	
Biospheric	4, 799	34.89	8.72	3.16	.014*	0.02	

Variable	*df*	sumsq	means q	statistic	*p*	η^2	Significant pairwise comparisons
Emotion Capacities: Regulation							
Reappraisal	4, 768	13.50	3.38	2.93	.020*	0.02	
Suppression	4, 781	43.83	10.96	5.66	< .001***	0.03	H/T, T/D, T/Ne
Emotional Capacities: Complexity							
Range	4, 754	8.47	2.12	2.65	.032*	0.01	
Differentiation	4, 754	8.47	2.12	2.65	.032*	0.01	

Note. Visit motivations were rated on a scale of 1 – 7. Personal values were scored on a scale of -1 – 7. Emotion regulation and complexity were scored on a scale of 1 - 7. Following Bonferroni correction for multiple comparisons, significance is set at 0.0025 (0.05/20). Pairwise comparisons were conducted, for variables whose effects survived correction, via Tukey's HSD between Experience Type groups (H = Harmonious, No = Novel, T = Transformative, D = Disengaged, Ne = Negative).

Appendix 2. Digital Art Experiences [3.3.2].

A1. Table 1. Comparison of aesthetic judgement and impact ratings between digital and museum art experiences.

Variable	M*digital*	M*museum*	*t(df)*	*p*	Cohen's *D*	95% CI
Liking	4.29	4.84	-6.11(1,580.33)	< .001***	-0.304	[-0.73, -0.37]
Beauty	4.55	5.07	-6.49(1,607.84)	< .001***	-0.321	[-0.67, -0.36]
Goodness	4.88	5.34	-6.03(1,589.36)	< .001***	-0.299	[-0.61, -0.31]
Meaningfulness	4.40	4.90	-6.06(1,597.54)	< .001***	-0.300	[-0.67, -0.34]
Complexity	4.40	4.92	-6.15(1,583.79)	< .001***	-0.305	[-0.68, -0.35]
Interest	4.66	5.30	-7.46(1,627.10)	< .001***	-0.368	[-0.80, -0.47]
Strength	4.60	5.06	-5.89(1,580.43)	< .001***	-0.292	[-0.62, -0.31]
Activity	4.32	4.55	-2.69(1,536.36)	.007**		[-0.40, -0.06]
Visc. - Cog.	4.25	4.33	-0.87(1,553.73)	.386		[-0.24, 0.09]
Feel better	5.52	5.99	-4.69(1,586.99)	< .001***	-0.233	[-0.67, -0.28]
Better person	5.31	5.82	-7.05(1,342.16)	< .001***	-0.356	[-0.65, -0.37]
Changed you	3.18	3.87	-5.22(1,511.97)	< .001***	-0.261	[-0.94, -0.43]

Note. Aesthetic judgements were rated on a scale of 1 – 7. Visc.-Cog. refers to a question which asked participants to describe their experience on a scale from 1 (Very visceral and embodied) – 7 (More detached and cognitive). Three impact questions, for which participants indicated if their experience made them feel better, made them a better person, and changed them, were rated on a scale of 0 – 10. Cohen's D effect sizes are reported for all variables whose significant effects survived Bonferroni correction of multiple comparisons (p = 0.05/12 = 0.0042).

A2. Table 2. Aesthetic ratings between museum and digital experiences and Experience Type groups.

Variable	Term	*df*	sumsq	meansq	statistic	*p*	η^2
Liking	ExT Profile	4	1,487.24	371.81	158.60	< .001***	0.27
	Setting	1	138.48	138.48	59.07	< .001***	0.02
	ExT Profile × Setting	4	105.69	26.42	11.27	< .001***	0.02
	Residuals	1,626	3,811.87	2.34			0.69
Beauty	ExT Profile	4	944.99	236.25	117.86	< .001***	0.22
	Setting	1	119.95	119.95	59.84	< .001***	0.03
	ExT Profile × Setting	4	50.79	12.70	6.34	< .001***	0.01
	Residuals	1,636	3,279.27	2.00			0.75
Goodness	ExT Profile	4	790.31	197.58	102.48	< .001***	0.20
	Setting	1	93.23	93.23	48.36	< .001***	0.02
	ExT Profile × Setting	4	9.51	2.38	1.23	.295	0.00
	Residuals	1,634	3,150.20	1.93			0.78
Meaningfulness	ExT Profile	4	788.14	197.04	83.06	< .001***	0.16
	Setting	1	104.75	104.75	44.16	< .001***	0.02
	ExT Profile × Setting	4	29.59	7.40	3.12	.014*	0.01
	Residuals	1,636	3,880.74	2.37			0.81
Complexity	ExT Profile	4	274.63	68.66	25.17	< .001***	0.06
	Setting	1	107.05	107.05	39.24	< .001***	0.02
	ExT Profile × Setting	4	26.77	6.69	2.45	.044*	0.01
	Residuals	1,635	4,460.43	2.73			0.92
Interest	ExT Profile	4	948.44	237.11	98.40	< .001***	0.19
	Setting	1	162.93	162.93	67.61	< .001***	0.03
	ExT Profile × Setting	4	35.01	8.75	3.63	.006**	0.01
	Residuals	1,637	3,944.64	2.41			0.77

Variable	Term	*df*	sumsq	meansq	statistic	*p*	η^2
Strength	ExT Profile	4	729.67	182.42	88.95	< .001***	0.17
	Setting	1	88.11	88.11	42.96	< .001***	0.02
	ExT Profile × Setting	4	23.22	5.81	2.83	.023*	0.01
	Residuals	1,636	3,355.22	2.05			0.80
Activity	ExT Profile	4	509.61	127.40	48.41	< .001***	0.11
	Setting	1	24.04	24.04	9.14	.003**	0.00
	ExT Profile × Setting	4	4.76	1.19	0.45	.771	0.00
	Residuals	1,636	4,305.14	2.63			0.89
Visc. – Cog.	ExT Profile	4	921.60	230.40	93.97	< .001***	0.19
	Setting	1	1.50	1.50	0.61	.434	0.00
	ExT Profile × Setting	4	13.33	3.33	1.36	.246	0.00
	Residuals	1,621	3,974.42	2.45			0.81
Feel Better	ExT Profile	4	2,134.73	533.68	191.32	< .001***	0.31
	Setting	1	117.52	117.52	42.13	< .001***	0.02
	ExT Profile × Setting	4	80.75	20.19	7.24	< .001***	0.01
	Residuals	1,623	4,527.20	2.79			0.66
Better Person	ExT Profile	4	376.35	94.09	54.43	< .001***	0.11
	Setting	1	120.08	120.08	69.47	< .001***	0.04
	ExT Profile × Setting	4	13.06	3.27	1.89	.110	0.00
	Residuals	1,621	2,802.01	1.73			0.85
Changed you	ExT Profile	4	2,042.08	510.52	91.18	< .001***	0.18
	Setting	1	220.58	220.58	39.39	< .001***	0.02
	ExT Profile × Setting	4	25.16	6.29	1.12	.344	0.00
	Residuals	1,622	9,082.02	5.60			0.80

Note. Aesthetic judgements were rated on a scale of 1 – 7. Visc.-Cog. refers to a question which asked participants to describe their experience on a scale from 1 (Very visceral and embodied) – 7 (More detached and cognitive). Three impact questions, for which participants indicated if their experience made them feel better, made them a better person, and changed them, were rated on a scale of 0 – 10.