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„Stimulus development to examine self-other distinction

- assessment of skin conductance responses "

verfasst von / submitted by

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„There's nothing (...) in another person, that doesn't also exist in me.

This is the only base for the human understanding of each other.“

(Erich Fromm)[1]

„Es gibt (...) in einem anderen Menschen nichts, was es nicht auch in mir gibt.

Dies ist die einzige Grundlage für das Verstehen der Menschen untereinander.“

(Erich Fromm)

[1](Fromm, 1959, Kap. 3b)

Abstract (English version)

Empathy is a fundamental principle for a satisfying interaction between human beings. Self-other distinction is the basis for empathy. This study therefore aims to identify stimuli capable of measuring self-other distinction in an appropriate way. In order to do so, videos have been produced that feature an incongruent and congruent situation regarding the feelings of a person. A group of 63 students rated the videos with regards to authentictity etc. The respondents filled in questionnaires concerning empathy (BVAQ, SPF, ECS, RM). Furthermore, an imitation-inhibition task and a perspective-taking task took place to measure motoric self-other-distinction as well as cognitive self-other distinction.

The skin conductance response was measured and analysed to get an idea whether self-other distinction is visible troughout incongruent stimuli and empathic accuracy troughout congruent and incongruent stimuli.

In contrary to the research hypotheses, no significant change of the skin conductance response occurred between the self- and the other-condition at incongruent videos. This leads to further assumptions and ideas of the phenomenon of self-other distinction and offers new research implications.

As hypothesized, no significant difference of the skin conductance response occurred between the rating of the actors' own emotions and the rating of the actors' emotion by the perceiver at the congruent and incongruent condition, which may lead to the assumption that empathic accuracy can be measured with this kind of stimuli.

–Key words: self-other distinction, incongruent stimuli, skin conductance

Abstract (German version)

Empathie ist ein fundamentaler Bestandteil für eine gelungene zwischenmenschliche Interaktion. Die Unterscheidung zwischen dem Ich und dem Gegenüber („Self-Other Distinction“) ist die Basis für Empathie. Diese Studie hat das Ziel, Stimuli zu identifizieren, die Self-Other Distinction messen können. Daher wurden Videos erstellt, die eine inkongruente und eine kongruente Situation hinsichtlich der Gefühle einer Person darstellen. Eine Gruppe aus 63 Studierenden bewertete die Videos hinsichtlich Authentizität usw. Die ProbandInnen füllten Fragebögen zum Thema Empathie aus (BVAQ, SPF, ECS, RM). Des Weiteren fand ein Imitation-Inhibition Task sowie ein Perspective Taking Task statt, um motorische und kognitive Self-Other Distinction zu messen.

Der Hautleitwert wurden gemessen und analysiert, um eine Idee davon zu bekommen, ob Self-Other Distinction unter inkongruenten Stimuli und Empathic Accuracy unter kongruenten und inkongruenten Stimuli sichtbar wird.

Im Gegensatz zur postulierten Forschungshypothese, gab es keinen signifikanten Unterschied der Hautleitwertdaten in der Self- und Other-Bedingung bei den inkongruenten Videos. Dies führt zu weiteren Ideen betreffend des Phänomens Self-Other Distinction, denen im Rahmen neuer Forschungsansätze nachgegangen werden kann.

Wie vermutet, gab es keinen signifikanten Unterschied des Hautleitwerts zwischen dem Rating der eigenen Emotionen durch den Schauspieler und dem Rating der Emotionen des Schauspielers durch den Beobachter bei der kongruenten und inkongruenten Versuchsbedingung, was zur Annahme führt, dass Empathic Accuracy mit dieser Art von Stimuli gemessen werden kann.

–Schlüsselwörter: self-other distinction, inkongruente Stimuli, Hautleitwert

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1. Introduction

Empathy is of great importance to our present. To act and communicate with empathy is the foundation of human society. Understanding interactions can take place if empathy is considered as a meaningful ability, whose importance is acknowledged by the society. For a general understanding what empathy summarises, the definition of De Vignemont and Singer (2006, p. 435) gives a good overview and provides orientation: Empathy occurs when someone is in (1) an affective state (2) which is isomorphic to another person's affective state, (3) which was elicited by observing or imagining another person's affective state, and (4) when someone knows that the other person's affective state is the source of his or her own affective state. Singer and Lamm (2009, p. 82) describe the aim of empathy in short as "to put ourselves into someone else's shoes", which gives a clear idea of a complex phenomenon.

The field of psychology helps people to explore more deeply what the base and the character of empathy is. The motivation to learn more about this phenomenon lies in the fact that, if one takes a closer look at several psychological studies, positive effects of being empathic or being treated with empathy can easily be recognised. If human beings have the feeling that the opposite understands their mental and affectives states (Singer & Lamm, 2009), they feel safe. To be treated with empathy works as a satisfying factor, while being treated without empathy can hurt our feelings (Singer & Lamm, 2009). People more likely notice a lack of empathy in their everyday interaction, but they do not necessarily see the benefit of someone acting with empathy. Although the positive sides are not always apparent, many profits of treating and being treated with empathy exist: For example, empathy is an indicator for fulfilling romantic relationships (Schmidt & Gelhert, 2017). Therefore, therapeutic programmes for couples often refer to the ability to act with empathy, for example to listen carefully to the partner. This is a practical example of how empathy can influence our daily life in a positive manner. Furthermore, empathy is an important factor in several professional fields: For psychotherapists, it is essential to know that empathic behaviour of the therapist is an important and supporting factor for the therapeutic progress (Herzog, 2016). Besides the fact that a lack of empathic behaviour can hurt our feelings, it is dangerous for a pluralistic society. An interesting finding

in this context is the fact that human beings seem to have the tendency of empathising more with persons who are similar to them, for example in terms skin colour, as the study of Riečanský, Paul, Kölbe, Stieger and Lamm (2015) and also the recent study of Fabi and Leuthold (2018) demonstrate. These are automatic processes. However, this does not mean that human beings are victims of their circumstances and cannot be aware of these mechanisms, because the core dimension of empathy is, as explained above, "to put ourselves into someone else's shoes" (Singer & Lamm, 2009). If this ability is trained and supported by society, empathic behaviour is possible if automatic mechanisms exist.

Missing empathic behaviour is often associated with mental disorders. For a long time, it was assumed that certain disorders have as a consequence a lack in empathy per se. To develop a clear and differentiated idea of this phenomena, it is important to change the image of someone who has a lack of empathy per se into someone who may lack certain aspects of empathy or to draw conclusions from empathy – like prosocial behaviour (Lamm, Bukowski & Silani, 2015). In any case, if researchers achieve the knowledge which component of empathy is disturbed, trainings for their improvement can be developed in the future. It is worth noting that the components of empathy are not stable and rigid, but can be changed (Seidel et al., 2013).

To understand what empathy means, one has to take a closer look at what is generally understood by the term empathy and furthermore distinguish it from other phenomena. When doing research in the field of empathy, the term *emotional contagion* will appear. Hatfield, Cacioppo and Rapson (1994) define it as a „multiply determined family of psychophysiological, behavioural, and social phenomena" (p. 4). It is also defined as a multilevel phenomenon: a stimulus comes from one individual, is perceived and interpreted by one or more other individuals, and produces corresponding emotions in those individuals. With the awareness of emotional contagion, the emotional tone of social interactions can be shaped (Hatfield et al., 1994).

Another phenomenon that arises in the context of empathy, especially when one takes a closer look at the nonverbal side, is *mimicry*, which can be defined as the tendency "to mimic and *s*ynchronize (…) movements with the facial expressions, voices, postures, movements and instrumental behaviors of others" (Hatfield et al., 1994, p. 10). Mimicry can be seen as a method of emotional contagion or, like Hess

and Blairy (2001) describe it, as an expressive component meanwhile emotional contagion would be defined as an affective state that matches the other's emotional display. Mimcry is, according to Rauchbauer, Majdandzic, Stieger and Lamm (2016), a parameter of social congruency. It can also correlate to the relationship of the actors. For example, a study of Bernieri, Reznick and Rosenthal (1988) showed that especially mothers mimic their own children. A study of Bernieri (1988) showed that couples which have the greatest synchrony in their movements, display the highest emotional attachment. Therefore, mimicry can contribute to a succesful interaction between humans (Louwerse, Dale, Bard & Jeuniaux, 2012) and may be an indicator for mental health and social development (Prochazkova & Kret, 2017).

Singer and Lamm (2009) see emotional contagion and mimicry as phenomena which can precede empathy, but they do not include the full dimension of empathy. If the definitions of emotional contagion and mimicry are compared to the definition of empathy, according to Vignemont and Singer (2006), one can clearly see one point of distinction. If a person is 'contagioned' by the emotion of someone else, he or she is not always aware of the fact that the emotions are caused by another person. The lines between the person who is 'contagioned' by the feelings and the person who causes the feeling blur. Therefore, one important aspect is not part of the definition of emotional contagion or mimicry: the ability to distinguish whether the source of the own emotions lies by oneself or another person. This important aspect of empathy is called *self-other distinction* (Singer und Lamm, 2009). Self-other distinction is a term which has arisen especially in the two last decades, at the same time as the uprising of social neuroscience. To gain a deeper understanding of empathy, the study of self-other distinction as a prerequisite is essential. Self-other distinction is the core dimension of empathy, a precondition for being empathic with someone else. Without this ability, trying to behave in an empathic way can not only result in personal distress, but also in egocentric behaviour (Singer & Lamm, 2009), because the own emotions are attributed towards someone else. To draw a clear line between oneself and someone else is therefore crucial for real empathy. Empathy does not mean to attribute the own emotions to another person, but has as a prerequisite the ability to distinguish between the emotions that another person has and the emotions the person itself would have in the situation.

The awareness and the control of emotional contagion are very important abilities in some professional lives. For example, as a psychotherapist, it is essential to differentiate between the patient as the source of an emotion and the self. If a person does not have the ability to distinguish between the emotions of oneself and another person, this may result in personal distress (Singer & Lamm, 2009). If we get too involved in the emotions and reality of someone else, without distinguishing between the self and the other, this stress can become so immense that it might lead to an aversive reaction. This means that self-other distinction is furtherwise essential for protecting the own mental health. For social workers, psychologists, doctors, counsellors, and other client-focused professions, the knowledge and the implementation of self-other distinction can protect them from high personal distress and the avoidance of emotional situations. Thomsen, Püttker and Weberling (2016) examined the way of empathising in trauma therapists. In this profession, a phenomenon called *second traumatisation* can occur, which means, that therapists show similar symptoms to a post-traumatic stress order, although they merely listened to the experiences and were not involved. In their study, the researchers found out, that the cognitive way of empathy – to take the perspective of the patient – is a protective factor concerning second traumatisation, meaning that emotional empathy is a risk factor. Studies that carefully examine the ways of empathising and which can make them vulnerable for psychological problems, are milestones in the assessment and the improvement of therapeutic strategies and the development of protecting strategies for therapists.

As self-other distinction is such an important phenomenon in the interaction with others, but also for the own mental health, it is necessary to take a closer look at the characteristics of this phenomenon. Research approaches have been developed in which self-other distinction is classified into a cognitive and an affective aspect (Steinbeis, 2016). Concerning the cognitive domain, self-other distinction can be measured through perspective-taking tasks and through imitation-inhibition tasks (Tomova, Von Dawans, Heinrichs, Silani & Lamm, 2014). Making the affective part of self-other distinction visible is quite complicated. In recent years, studies have often developed their own tasks, for example the emotional egocentricity task, like Tomova et al. (2014).

If self-other distinction should be visible in an experiment, an incongruent and a congruent condition are required. This can be realised through situations in which the target would have the same reaction as the observer (congruent condition) and situations, in which the reaction would differ. For example: An actor tells a story in which observers generally have a positive feeling, but the actor reports negative feelings towards it (different emotional valence). To create experimental situations like that apart from affective experiences, is the pioneering idea of the study of Lamm, Meltzoff and Decety (2010). The researchers aimed to measure empathy with persons who are not like us (self-other distinction), with a focus on the cognitive component of self-other distinction. The aim was to make self-other distinction visible not only in an affective way, like most existing studies in the context of self-other distinction do, but to test broader aspects of self-other distinction. Studies like this from Lamm et al. (2010) are rare. There is a lack of suitable stimulus material to examine self-other distinction. That is the innovation and the aim of the study invented by A. S. Längle (2015): to create valid stimuli for the measurement of self-other distinction.

Besides self-other distinction, this study also measured whether the videos are suitable to make *empathic accuracy* visible. Empathic accuracy can be seen as the operationalisation of empathy and was first described by Wilhelm Ickes (1993). This phenomenon is defined as the ability to accurately infer the specific content of another person's thoughts and feelings (Ickes, 1993, p. 588). Empathic accuracy can be measured through the comparison of the target person's thoughts and feelings with the perceiver's thoughts and feelings (Ickes, 1993). The idea of producing videos in which the target persons reported an emotionally charged life-event was realised by Marangoni, Garcia, Ickes, and Teng (1995) and served as a methodological example for the study of A. S. Längle (2015). The experimental procedure of Marangoni et al. (1995) is as follows: Videos were produced in which a psychotherapy session was recorded. In these therapy sessions, in which only women participated as clients, topics like divorce and role conflicts were discussed. After the production of the stimuli, the actors watched their own videos and stopped them, if they remembered a specific thought or feeling. They wrote down the thoughts or feelings. Then, the perceivers watched the videos and were instructed to infer the content of the clients thoughts and feelings and to write it down. In the end, the two lists were compared, and as a consequence, empathic accuracy could be measured. The concept idea of A. S. Län-

gle (2015) was, instead of using a list that required time and effort, to use a rating dial, like Levenson and Ruef (1992) did in their study. In this experiment, marital interactions were videotaped. The actors rated their own feelings and the test persons rated the feelings of the actors via a rating dial. So, an affect rating dial is used to give information about the perceived emotion in social interactions (Ruef & Levenson, 2007). In section 3, a detailed description of the affect rating dial as a method will be given.

The feelings of human beings can be made visible not only via self-reporting but furthermore throughout physiological data. Empathic behaviour is reflected in the body. Lamm, Bukowski and Silani (2016, p. 1) explain this mechanism as follows: “we co-represent another person’s affect by engaging brain and bodily functions underpinning the first-hand experience of the emotion we are empathizing with“. The activation of brain and bodily functions during this process can become visible through physiological measurements. The study of Levenson and Ruef (1992) is an example for such a procedure and their experiment is an empirical demonstration that a physiological link between target and perceiver exists: similar emotions of the perceiver and the target reflect in their physiological substrate. Furthermore, it was found that a greater physiological link between the subject and target occurred when the subject rated the target's affect accurately.

The study of Levenson and Ruef (1992) serves as a methodological example and an essential inspiration for the present study. The scientists examined five physiological variables, whereas in the study of A. S. Längle (2015) only two physiological variables were measured (heart rate and skin conductance response). In this thesis, it was examined if the skin conductance response of the actor in the video is similar to the data of the perceiver or if they differ. By analysing the similarities and differences, a first reference for empathic accuracy and the ability to distinguish between oneself and another person is given.

The problem that challenges neuroscientists is the lack of methods that make self-other distinction visible. The study aims to contribute to the development of new stimuli.

2. Objective

2.1 Research question

The idea of using videos to learn more about empathic accuracy was realised for example in the study of Marangoni et al. (1995). If one wishes to use videos for the measurement of self-other distinction instead of empathic accuracy, an adaptation of the videos is necessary. It is known from previous studies that self-other distinction can be visible throughout congruent and incongruent situations, like for example in Lamm et al. (2009). The authors used photos as a method. A. S. Längle (2015) used videos to examine self-other distinction. She did this with the knowledge about congruent and incongruent conditions for the analysis of this phenomenon.

The examination of the physiological link between target and perceiver, following the example study of Levenson and Ruef (1992), should additionally give valid and undistorted information whether the videos are suitable stimulus material to make self-other distinction visible. With the use of the skin conductance response a common and reliable physiological method is applied, which makes empathic processes measurable.

So the goal of this study is to test whether the created videos are good stimuli to make self-other distinction and empathic accuracy visible, and the focus of the master thesis is the analysis of the skin conductance response in order to get information concerning the empathic processes of the study participants.

2.2 Hypotheses

In the study, hypotheses concerning empathic accuracy and self-other distinction are tested. The stimuli are videos in which the actor tells a congruent story, as well as videos in which the actor tells an incongruent story. Each video had a specific time structure: First the actor introduces him/herself, then the story is introduced (period 1), then the emotional period with the description of the salient event follows (period 2), and, in the end, an explanation is given, so the cognitive period finishes the experiment run (period 3) (see section 3.1).

Concerning empathic accuracy, the hypothesis is that the physiological and behavioural data of actor (target) and perceiver will be similar at congruent and incongruent videos in all three time phases.

Differences:

H0: EA(at period 1): perceivers other rating-targets self rating → significant

H1: EA(at period 1): perceivers other rating-targets self rating → not significant

H0: EA(at period 2): perceivers other rating-targets self rating → significant

H1: EA(at period 2): perceivers other rating-targets self rating → not significant

H0: EA(at period 3): perceivers other rating-targets self rating → significant

H1: EA(at period 3): perceivers other rating-targets self rating → not significant

Empathic accuracy is defined as the ability to accurately infer the specific content of another person's thoughts and feelings (Ickes, 1993, p. 588). If the study participant tries to deduce the feelings of the actor in every single time period, there will not be a change in the physiological data between the three time phases, because actor and perceiver display the same emotional dimension when the emotions are isomorph.

In contrast, self-other distinction should be visible at incongruent videos. The physiological data of perceiver and target should differ between target and perceiver at period 2 and 3, when the unusual story is told. The explanation for that idea: If the perceiver can retain his own emotions (which is part of the definition for self-other distinction), there should be a difference between the targets emotions and the perceivers emotions.

Differences at incongruent videos:

H0: SOD(at period 1): perceivers other rating-perceivers self rating → significant

H1: SOD(at period 1): perceivers other rating-perceivers self rating → not significant

H0: SOD(at period 2): perceivers other rating-perceivers self rating → not significant

H1: SOD(at period 2): perceivers other rating-perceivers self rating → significant

H0: SOD(at period 3): perceivers other rating-perceivers self rating → not significant

H1: SOD(at period 3): perceivers other rating-perceivers self rating → significant

3. Methods

3.1 Participants

The students' attention was drawn via advertisements at the Faculty of Psychology. They participated voluntarily in the experiment. No monetary incentive was given but for their participation in the study, some students could receive ECTS points for a bachelor seminar.

63 young people participated in the study, two were excluded. The group consisted of 46 women and 15 men. Self-other distinction under normal circumstances (under the influence of stress, there are indications that a gender difference in favor of women exists, like Tomova et al. (2014) state in their study) is not considered a gender dependent phenomenon. For that reason, a counterbalancing of gender was not necessary.

Most volunteers were students (91.8%), 4.9% were employed, and 3.3% selected “other“. Most participants (75.4%) had an AHS Matura, 6.6% had a bachelor's degree, 4.9% held a master's degree, and 11.5% had obtained a degree from a BHS („Berufsbildende Höhere Schule“). The participants were between 18 to 32 years old (M=20.75, SD=3.09) (Längle, 2015).

The group of the study participants was quite homogenous concerning age, sex and educational level. As there is no evidence from previous studies, that self-other distinction is a phenomenon that depends on these criteria, problems concerning insufficient representation can be excluded.

The assignment to the three different experimental groups (G1, G2, and G3) happened at random. Groups G1 and G2 consisted of 21 participants, while G3 consisted of 19 participants because two participants were excluded. One subject showed an extraordinary affect rating behaviour in the event to get two packages of pasta for the price of one, which was rated higher than the feeling of being in love. The other participant, which results had to be excluded in the analysis, knew the intention of the study, which led to an extraordinary rating behaviour. As the rating behaviour differed extremely from the norm and would lead to distorted results, the data was excluded in the analysis.

Not only the volunteers, but also the actors rated their own videos. The 11 target persons, five female, and six male, were friends of the investigator. Their ages ranged from 22 to 34 years (M = 27.36, SD = 3.78). The majority of them had no specific experience in acting. Two of them were acting in their leisure time, one person was enrolled in a drama school (however, no video was validated). Five of them were students, six were employees. From all target persons, the EDA (electrodermal activity) data was collected (Längle, 2015).

3.2 Structure of the videos

Every video, congruent or incongruent, had a specific time structure, in order to make changes in the skin conductance and as a consequence self-other distinction visible.

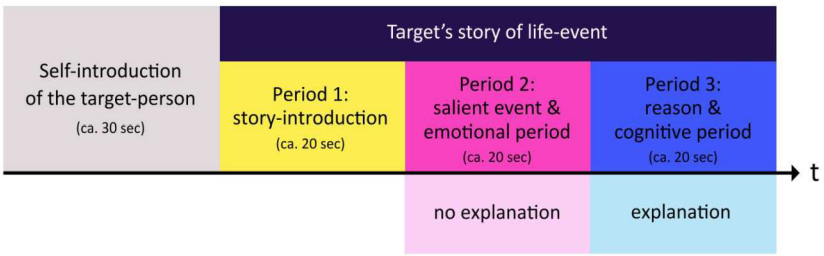


Figure 1. Time structure of the video (Längle, 2015)

Every video started with an introduction of the target person (approx. 30 seconds), where the actor says his/her name, where he/she comes from, and briefly talks about his/her current job and leisure activities. Afterwards, the story was introduced. Then the period of the story-introduction began (approx. 20 sec). In period 2, the salient event was told and the emotions, which the actor had, congruent or incongruent, were described (approx. 20 sec). The exact time phase differed from test subject to test subject. At the end of every video cycle, an explanation for the emotions connected with the salient event, was given. This differentiation between the emotional and cognitive period was important to learn more about the emotional and cognitive aspects of the empathic process.

3.3 Affect Rating Dial

An affect rating dial is used to assess and measure emotions in social contexts. According to Ruef and Levenson (2007), it is unique among subjective measurements of affect because it allows to assess the time course of an emotional experience. Written methods, like writing the own emotions, are interrupting the flow of an experiment and do not allow the continuous measurement of emotions.

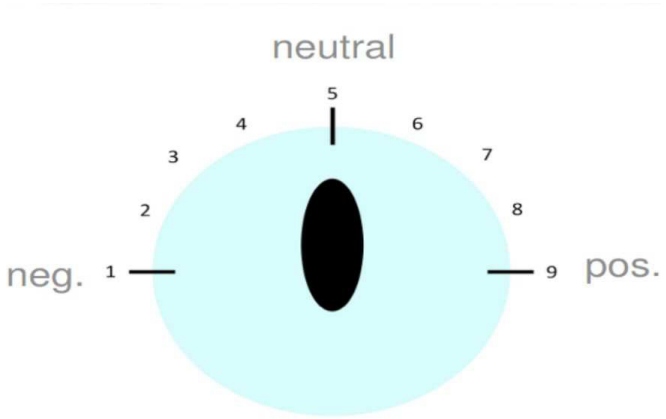


Figure 2. Rating dial (Längle, 2015)

The dial represents a nine-point Likert scale, arranged as an 180° curve. The subjects can rate their actual emotion with an arrow that indicates the ratings as negative, neutral, positive, or in between.

3.3 Psychological tests

In the behavioural and affective analysis of the study made by A. S. Längle (2015), several tests took place for the assessment of psychological traits.

For example, the Saarbrückner Persönlichkeitsfragebogen, the Bermond-Vorst Alexithymia Questionnaire, the Emotional Contagion Scale, the Reading the Mind in the Eyes Task, the imitation-inhibition task, the perspective-taking task and the Post-Video Questionnaire were part of the experimental procedure. These questionnaires have the aim to assess phenomena like alexithymia or autism.

3.4 Physiological data

The physiological component for testing whether the videos are suitable stimuli to make self-other distinction visible was the electrodermal activity. Like Braithwaite, Watson, Jones and Rowe (2015) describe, electrodermal activity (EDA) is the broader term used for defining autonomic changes in the electrical properties of the skin. These changes occur if human beings are, for example, in distress. EDA is an indicator for general arousal and a method sensitive for changes already in the lower arousal range, whereas the heart rate is an indicator for the high arousal range as the researchers Epstein, Boudreau and Kling already examined in 1975.

Stressful reactions, i. e. a high arousal in a test subject, can become visible through physiological data (Najström & Jannsen, 2007). This knowledge is for example applied in contemporary methods like biofeedback. As patients are not always aware of their high stress level and the physiological consequences, to inform about the current skin conductance response or the heart beat is an useful tool in order to regulate them and reduce the inner tension, for example via deep breathing or the relaxation of the muscles.

The electrodermal activity is an indicator of general arousal and changes due to innervation of sweat glands. The skin conductance response increases because sweat alters the electrical potential. Human beings do not only sweat due to thermoregular reasons but the sweat gland activity also increases when someone is in a certain emotional state. It occurs due to hypothalamic-limbic connections. By having a closer look at the electrodermal activity, we can see if someone is an emotional state, but we cannot derive the exact emotion that someone has. For that reason, the use of „lie detectors“ (polygraphic testing) is highly controversial, because from the increase of the electrodermal activity, we know that someone is an affective state, but it is not possible to read the exact emotion and the reason for it. In someone being questioned by the police who is asked a question and fears about a possible sentence, a fearful state might occur even though he/she is telling the truth (Boucsein, 2012).

When the stress level is high, the skin conductance response (SCR) increases. The skin conductance response is a fast, sudden increase, while the skin conductance level (SCL) is the baseline of the skin conductance. The skin conductance response is the *phasic* and the skin conductance level the *tonic* component of the electrodermal

activity. The skin conductance response is used as a physiological parameter in many clinical psychological studies (Lin, Lin, Lin & Huang, 2011). In the research of empathy, the skin conductance response is a commonly measured parameter.

The advantage of assessing physiological data in the context of empathy is the authenticity of the data that the examiner receives. As self-reported measures like questionnaires always involve the potential danger of responses influenced by the phenomenon of social desirability, the assessment of physiological parameter is always a good alternative or addition in experimental studies, because the researchers receive unbiased data about the arousal of a test person. Of course, there are other disturbing factors, like movements or the consumptions of stimulants, which have to be controlled.

The experiment of Levenson and Ruef (1992) served as a methodological example for the present study. Their study showed that similar emotions in the observer result in similar emotions in the perceiver, reflected via the skin conductance response. Observing a person in distress can produce similar emotional arousal in the observer. If the perceiver is able to retain the emotions, a difference in the physiological data between the perceiver-self and the perceiver-other rating should occur.

The methodological approach of Boucsein et al. (2012) served as an example for the experimental procedure of the study. For the measurement of the electrodermal activity, the electrodes were placed at the volar middle phalanx of the index and ring finger of the non-dominant hand (Boucsein et al., 2012). A. S. Längle (2015) rather applied the electrodes to the middle phalanges. The distal phalanges are proposed by Boucsein et al. (2012) but it turned out that the distal phalanges were to small for the electrodes, especially for female participants. So for all participants, the middle phalanges were used in order to have a standard measurement. The ground electrode was placed at the wrist of the non-dominant hand (Boucsein et al., 2012). A. S. Längle (2015) placed one electrode on the right lateral clavicle and the other at the left rib. The suggestion to do so was retrieved from the publication guidelines of Jennings et al. (1981). Before the electrodes were attached, the skin area on which the electrodes were placed, was cleaned with ethyl alcohol (70 %). The exclusion criteria for the EDA analysis are listed in table 1 (Längle, 2015).

Table 1. Exclusion criteria

EDA analysis:

Disorder of the central nervous system
Psychiatic disorder (depression, schizophrenia...)
Use of neuropsychotropic medications
Large amount of alcohol or other psychotropic substances in the last 24 hours
Dependency of drug, alcohol, or pharmaceutical drugs
Insufficient sleep in the last 24 hours
Metallic objects on the body/in clothing

Additional for EDA

Prior negative reactions to EDA
Chronic dermatological condition

The participants were also asked for the consumption of caffeine and nicotine. These stimulants are known for having an impact on skin conductance responses (Boucsein et al., 2012). It was important for the evaluation to know whether the consumption was higher than the average daily amount because then, an extraordinary physiological response could occur, unless someone is used to a regular high amount of these stimulants.

Another important criterion that needed to be checked before the experiment was the handedness.

Angelika Längle informed the participants about possible side effects. In an EDA and ECG study, no severe effects could occur but it is important to inform the participants about harmless effects, like light skin irritation due to the electrodes. The participants had to sign that they received the information and wanted to proceed.

4. Experimental setting

4.1 Test procedure

The experiment took place in the laboratory of the SCAN Unit, at the Faculty of Psychology in Vienna. There were three test groups (G1, G2, G3) and the assignment to the groups was randomised.

In every test group, four videos were shown: two congruent and two incongruent videos. Each participant was assigned to one of three groups (G1, G2, and G3). As stated before, two groups consisted of 21 participants and one group (G3) consisted only of 19 participants. The videos were counterbalanced with two videos of negative valence in the congruent condition and two videos with positive valence in the incongruent condition. In group three, an error occured in the reasoning, so three out of four videos had a negative valence instead of two.

Before the sessions began, participants filled out the questionnaires: sociodemographic data, the Bermond Vorst Alexithymia Questionnaire (Version B), the Saarbrückner Persönlichkeitsfragebogen, Emotional Contagion Scale, and the Reading the Mind in the Eyes task. They read the exclusion criteria. Several indications make a participation in the experiment impossible: psychiatric diagnoses like schizophrenia or depression. It is known that, for example, patients with an anxiety disorder tend to have a higher skin conductance level (SCL) than test subjects without an anxiety disorder. Furthermore, the consumption of psychopharmaceuticals was a criterion for exclusion. It is known that drug interactions are reflected in the skin conductance level, more so than other physiological substrates. Pharmaceuticals, like benzodiazepines, can lead to a change of the electrodermal activity (Boucsein, 2012) which makes a valid measurement impossible.

All exclusion criteria are listed in Fig. 2. The participants signed the exclusion criteria. Handedness was checked with the Edinburgh Händigkeits Inventar. The participants were asked to leave all electronic devices and it was checked that any piercings, earrings etc, which could interfer with the ECG were removed, and EKG electrodes were attached. The specific part of skin on which the electrodes were placed was cleaned with ethanol (70%). The ground electrode was attached on the non-dom-

inant hand (i. e. the left hand, since all participants were right-handed). The electrodes were placed on the middle phalanx and on the inner face of the index finger and ring finger of the non-dominant hand. One electrode for the ECG application was attached at the right lateral clavicle and the other at the left rib. It was paid attention to a comfortable position for the rating dial. Before the experiment started, the instructions were explained to the participants. To ensure that they understood the instructions, they were asked to repeat them in their own words.

Afterwards, a rating dial calibration took place. Participants were instructed to point the index of the rating dial for three seconds to very negative (the minimum), very positive (the maximum), and neutral (the middle) of the scale. The calibration helped to check how exactly a participant points to the middle of the scale for indexing neutral.

For the perceivers-other rating, the instruction was: „Bitte versuche Dich auf die Person, die gleich zu sehen ist, einzulassen. Versuche Dich in die Person und ihre Emotionen einzufühlen und stufe diese mittels des Rating-Dials ein. Bitte stelle das Rating-Dial auf „neutral“ und drücke die “Leertaste”, wenn Du bereit bist.” This way, the participants were asked to empathise with the displayed person and to rate the emotions of him/her with the rating dial (Längle, 2015).

For the perceivers self-rating, the instruction was “Du siehst jetzt das gleiche Video noch einmal. Aber diesmal versetze Dich bitte in die dargestellte Situation. Wie würdest Du selbst (Du mit Deiner ganz persönlichen Biographie und Persönlichkeit) Dich in dieser Situation fühlen? Stufe bitte mittels Rating-Dial das Gefühl ein, welches Du in dieser Situation hättest. Bitte stelle das Rating-Dial auf „neutral“ und drücke die “Leertaste”, wenn Du bereit bist.“ So the participants were asked to take the perspective of the actor and to imagine how they would feel with in the situation, concerning their own history and personality (Längle, 2015).

The exact process for each video of a group (G1, G2, or G3) was:

–30 seconds fixation cross (which serves as resting ECG)

–instruction for perceiver-other rating

–one of the four videos

–30 seconds fixation cross

–-instruction for perceiver-self rating

–-the same video as before

This process was repeated four times in total, one time for each of the four videos per group (G1, G2, or G3). Each video was watched twice and lasted about 90 seconds. Whenever the participants asked whether the videos are true, the examiner said that the stories are autobiographical life events. It was necessary to withhold the information about the incongruent videos, because otherwise, the experimental manipulation would not have worked. After the study, the situation was clarified and the truth was told: that the videos were indeed autobiographical life events, but that half of them (the incongruent ones) were invented. This explanation was necessary, because the possibility cannot be excluded that the actor and the test person meet one day in real life. To prevent certain antipathies, it was considered important to inform the participants about the experimental setting.

After the session, the participants filled out the post-video questionnaire. The responses were given on a nine-point Likert scale.

1. Finden Sie die dargestellte Person interessant? / Do you find the person in the video interesting?

2. Wie attraktiv finden Sie die dargestellte Person? / How attractive do you find the person in the video?

3. Wie sympathisch finden Sie die dargestellte Person? / How likeable do you find the person?

4. Hatten Sie das Bedürfnis sich von der erzählten Situation distanzieren zu müssen oder zu wollen? / Did you feel the need to distance yourself from the described situation?

5. Haben Sie das Gefühl nicht “bei der Sache“ gewesen zu sein/abgeschweift zu sein? / Do you feel you were distracted/zoned out during the video?

6. Waren Sie in Ihrem Leben schon einmal in einer ähnlichen Situation? / Have you been in a similar situation before? (For this question four answers were listed: “nein, gar nicht“, “annähernd ähnlich“, “ähnlich“, and “ja, genau gleich“).

After the post-video questionnaire, the participants were asked to fulfill the shelve task (perspective-taking) and the finger lifting task (imitation-inhibition task). At the end, they were asked if they want to comment on anything to check the plausibility of the videos. Angelika Längle now told them that half of the videos (the incongruent ones) were not true.

4.2 Targets self-rating

For the target self-rating, the actors watched their own videos and rated their own emotions. The instruction was: “Please rate the emotions you had while describing“. The target self-rating measured throughout the behavioural data did not work as expected, hypothesised that it may be not the case at the physiological data. Indeed, no irregularities concerning the physiological data for the self-rating were noticed. As explained later, via the comparison of the physiological data of the targets self-rating and the perceivers-other rating, tendencies about empathic accuracy could be measured.

5. Results

5.1 Preparation of the data

For each actor, three periods of interest were determined: 1. story-introduction, 2. salient event and emotional period, 3. reason and cognitive period. The exact time phases varied from respondent to respondent (See Table 2) – and as a consequence made the analysis more complex. In order to analyse the data, it had to be considered that the three periods of interest were different for each participant. Every test person had a specific trigger code. The aim of the script which Andreas Gartus wrote, was the combination of the trigger recognition (via text file) with the reading of the EDA data that was recorded. It worked for most cases; sometimes a later adaptation of the threshold for the trigger recognition was necessary. This kind of script runs from the Matlab command window. Matlab R2017a (student version) was used. When the trigger recognition was successful, it was saved as a Matlab file, which could be further analysed in Ledalab.

Table 2. The three time phases for each video

The three time phases for each video (time in seconds)

G1 Lesly4_con	**G1 Sora6_con**
33–67 (1. story-introduction)	45–52
69–70 (2. salient event & emotional period)	56–59
73–87 (3. reason & cognitive period)	65–90
G2 Sora2_inc	**G3 Sora 5_con**
29-42	26-47
45-53	50-66
58-76	69-85

G1 Rudi 3inc	**G2 Rudi 3con**
38-46	42-53
58-70	56-64
76-101	69-82
G3 Rudi 5inc	**G1 Michi 12 inc**
29-41	30-54
45-63	69-74
67-85	78-83
G2 Michi 1cong	**G3 Michi 3con**
31-39	25-47
41-49	56-72
57-82	75-86
G2 Olcay 5inc	**G3Stephan 3inc**
34-43	23-45
47-60	61-74
68-88	79-84

5.2 Analysis of the Skin Conductance Response (SCR)

For the analysis of the skin conductance response, Ledalab V. 3.4.9 was used – an open-source programme, which is based on Matlab, and can convert data into Matlab files. Matlab files prepared for further analysis was achieved thanks to the using of scripts by Andreas Gartus. Sometimes, the threshold for recognising the trigger had to be changed manually.

For this study, the continuous decomposition analysis was the method of choice for analysing the skin conductance response, meaning that the data is divided into phasic and tonic components. The tonic activity represents the skin conductance level (SCL), while the phasic activity represents the skin conductance response (SCR).

The SCR is a quickly varying parameter and SCRs are specific responses. SCL represents the phase when no SCRs occur. Ledalab had the ISCR (integrated skin conductance response) as output: the integral of SCR (skin conductance response).

As a parameter for the analysis, the amplitude 0.1 µs was chosen, which is a common threshold in EDA analysis. This means that every skin conductance response exceeding the value 0.1 µs was included in the analysis.

At the beginning of every analysis concerning the skin conductance response, an artifact correction should be made. According to Boucsein (2012), there are two main sources of artifacts: such, that derive from the measurement procedure, like frequency noise, and such that have their cause from physiological reactions which are not the electrodermal activity, such as the movements of muscles during test procedure.

Artifacts are characteristic, small, jagged irregularities which occur spontaneously in a skin conductance record.

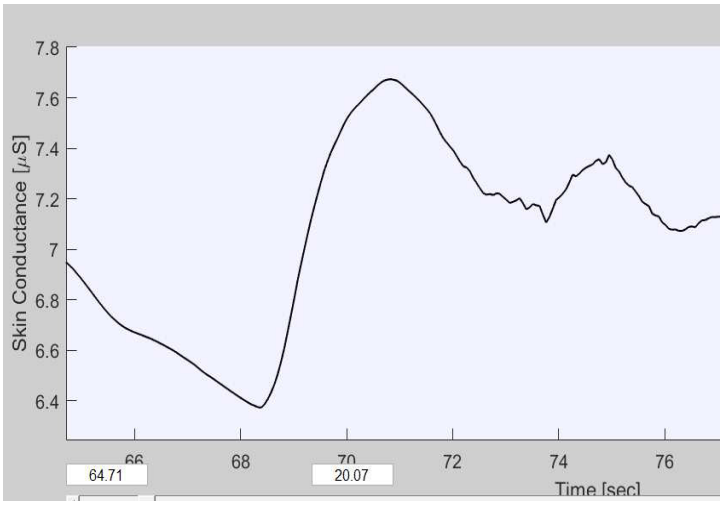


Figure 3. Artifact around second 74.

The challenge for each scientist working with electrodermal activity is to keep the artifacts at the lowest level as possible. A completely artefact-free skin conductance test session can hardly exist as human beings are always in motion, but researchers should at least try to avoid many and enormous artefacts by telling the study participants that they can relax during the test procedure and that speaking should be avoided in order to receive mainly artifact-free recordings. Nonetheless, small artefacts will probably occur and sensible removement from artefacts is necessary, in order to receive undistorted data. The challenge is to remove artefacts when it

is absolutely necessary and in a modest way, because if the correction is exaggerated, distorted data may be the consequence.

The artifacts were corrected by keeping these challenge in mind. The correction was made manually by going through the data set of every person and checking whether these characteristic features exist. If an outlier (a sudden, jagged, characteristic decrease or increase of the skin conductance response) was found that could not be explained by the experimental setting, it was corrected. The programme Ledalab allows for manual artifact removal, which was carried out in a very modest and careful way.

5.3 Main effects of empathic accuracy and self-other distinction

For the analysis, the means of every time phase in every experimental condition had to be compared. If an experiment consists of metric variables and has a normal distributed sample, the t-test or the ANOVA are the methods of choice when the goal is the comparison of means. In the present study, two ways of calculating the data were possible: the t-Test for dependent samples or the ANOVA with repeated measures. Both would have been feasible but the decision was made in favour of the ANOVA because in the study, there are three test groups that compare two different experimental conditions. If there are more than two test groups, an ANOVA is recommended because it is considered more accurate. Furthermore, an ANOVA tends to have more test power than a t-Test, because no accumulation of the alpha error occurs (Bühner & Ziegler, 2009).

For the incongruent condition and the testing of self-other distinction, the main effects of rating*video, rating*phase and video*phase were tested. Especially time phase 2 (salient event, emotional period) and time phase 3 (cognitive period) were interesting with regards to the research questions.

For the main effect of rating*video, the results turned out to be not significant ($p = 0.95$, $F(1,54) = 0$, part. $Eta^2 = 0$). For rating*phase and video*phase, neither significant main effects were found ($p = 0.30$, $F(2,53) = 1.22$, part. $Eta^2 = 0.04$ and $p = 0.19$, $F(2,53) = 1.69$, part. $Eta^2 = 0.06$). All main effects were clearly not significant ($p > 0.05$), meaning that the null hypotheses concerning period 2 and 3 (H0:

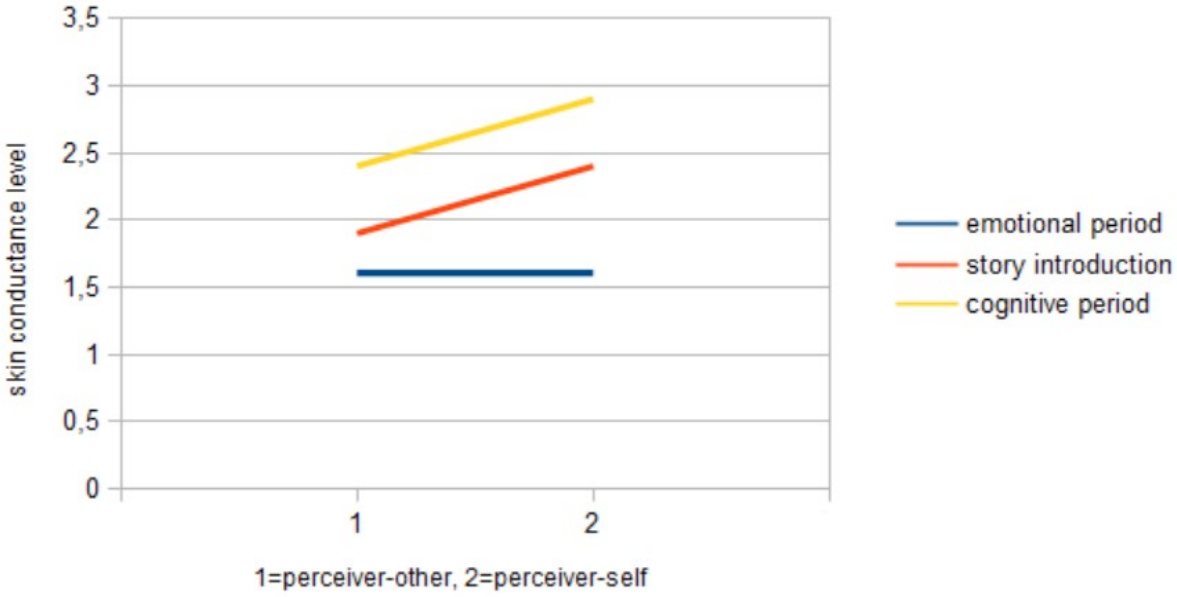


Figure 4. Interaction/main effect rating*phase

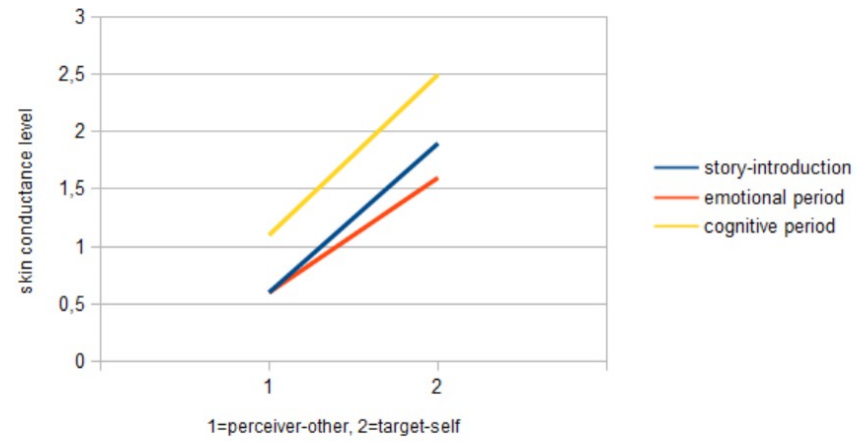
SOD: perceivers other rating-perceivers self rating → not significant) cannot be rejected. Obviously, the study participants were not able (or at least, not sufficiently able) to distinguish between the self and the other person and to retain their own emotions, because no significant difference in the physiological data between the perceiver-self ("how would **you** feel in the situation") and the perceiver-other rating ("try to feel the emotions of the displayed person") occurred.

Some tendencies in experimental studies only become visible and understandable by having a closer look at the results graphically. For the main effect of rating*phase, it is noticeable that in the emotional period no change of the skin conductance level concerning the perceiver-self and perceiver-other condition occurs, meaning that there was no significant distinction between the self and the other. But in the story-introduction, phase 1, and in the cognitive period, phase 3, a slight change between the perceiver-self and perceiver-other condition is notable, although it is not significant. This is an interesting fact for the discussion of the results and further implications.

For empathic accuracy, the hypothesis is that the physiological data of perceiver and actor is similar for all three phases under all conditions (congruent and incongruent) because there should be the same emotional valence for both when the emotions

are isomorph. Taking a closer look at the main effects, rating*phase: p = 0.20, F (2,53) = 1.65, part. Eta² = 0.06, rating*video: p = 0.53, F (3,52) = 0.74, part. Eta² = 0.04 and phase*video: p = 0.51, F (6,49) = 0.89, part. Eta² = 0.10, it becomes clear that the null hypothesis can be rejected. All main effects are not significant ($p > 0.05$), meaning that the physiological data can be described as similar. If one takes a closer look at the results graphically, for example at the main effect video*rating, one can see that there is a change in the skin conductance level between the perceivers other-rating and the targets self-rating, but its not significant. It is an evenly distributed illustration of the results. There are four graphs that represent the course of the experiment (1. congruent video, 2. incongruent video, 3. congruent video, 4. incongruent video). No remarkable, seemingly systematic differences regarding the incongruent and congruent condition can be noticed and nothing is extraordinary which could be interesting for further implications.

Figure 5. Interaction/main effect video*rating



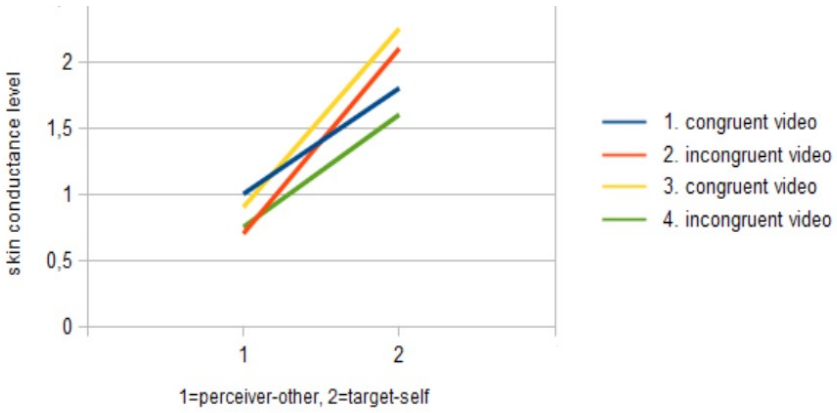


Figure 6. Interaction/main effect rating*phase

Upon closer examination of the graphic concerning the main effect rating*phase, one can see a similar image like the rating*phase interaction effect at the self-other condition. A clear increase of the skin conductance level occurs at the cognititive period, which undoubtly stands out from the other time periods. Although this difference is not significant, it leads to further impulses concerning the phenomenon of self-other distinction and its characteristics.

6. Discussion

The superior goal of the experimental study was to check if the videos created by A. S. Längle (2015) are suitable stimuli to make self-other distinction and empathic accuracy visible, which then may be used in further studies. In the field of researching empathy is a lack of useful stimuli for the measurement of, especially, self-other distinction, which makes the development of new stimuli as a measurement tool necessary.

A. S. Längle (2015) found out that, concerning the behavioral data, all incongruent videos can be used as a stimuli material to make self-other distinction visible, whereas the congruent videos were mostly not suitable for measuring empathic accuracy – so exactly the opposite of the results concerning the physiological data.

The analysis of the physiological data was used as an additional tool beside the behavioural data for testing whether the videos are appropriate for this purpose. Concerning self-other distinction, the null hypothesis could not be rejected, which leads to the assumption that the videos are, from a physiological perspective, not suitable stimuli to make the distinction between one-self and another person visible. However, the analysis of the behavioural data, like A. S. Längle (2015) conducted, presents another picture: By evaluating the results of her experimental study, she came to the conclusion that the videos are useful for measuring self-other distinction. So the idea of using the videos for the measurement of self-other distinction should not be overruled – there are some assumptions concerning the specificness of the physiological data which may not make them suitable stimuli from this methodological approach, not justifying the strict rejection of the idea of using them in further studies for the measurement of self-other distinction.

An interesting result is, if a closer look to the time periods is taken, that one can notice that, at the cognitive period, a change in the skin conductance level occurs. For this phenomenon, different theoretical ideas come to mind. One reason could be that the time phase of the emotional period is too short to make self-other distinction visible in this limited time window. In total, the emotional period is 20 seconds long, but in the incongruent videos, the unusual feeling is told towards the end of this pe-

riod. Maybe the change in the cognitive period is a time lag of the emotional period and the telling of the unusual feeling. The irritation due to the unusual story may not occur immediately but needs more time than assumed in the experimental planning. It would be interesting to know if there would be a different dynamic of the skin conductance response when the salient event is told earlier. The experimental planning could be changed towards the telling of the salient event and afterwards, the end of the story is told, and not immediately, the reason for the feelings are given. For further studies with similar setting, this may be an interesting suggestion.

Furthermore, other possible explanations come into mind: As self-other distinction is a highly cognitive phenomenon and also involves cognitive processes, like perspective-taking, the cognitive level on which the actor explains his/her emotions may lead to more irritation in the test persons, and to a higher arousal as a consequence. It may be that the justification for the different and surprising story might be more stressful than the different emotion per se. This leads to the assumption that the stress moment begins when the test subjects began to think what the reason for the different emotion is. If one thinks about the phenomenon self-other distinction, this is quite clear and plausible because it requires the active perspective taking and higher cognitive processes.

Concerning empathic accuracy, the null hypothesis could be rejected. The videos can be considered useful to measure empathic accuracy. In contrast to the testing of the behavioral data, irregularities of the target's self-rating data were not noticed. So it may be that the physiological data reflects the taking of the role of the actor better and may lead to a purer transportation of the own feelings. The self-rating of own emotions requires the creation of distance to the own role, while the physiological data reflects the pure emotional state. This is also an interesting implication for further research. When it comes to self-rating or self-perception, the measurement of electrodermal activity might be an useful tool for other experimental studies. The physiological substrate as an unbiased reflective “transport medium“ of the own emotional valence can be considered as a practical measurement method for emotional valence.

A. S. Längle (2015) describes in their diploma thesis that another instruction would be useful (“Please rate the emotions you are displaying.” instead of “Please

rate the emotions you had while describing."). She hypothesised that not all actors may be able to differentiate from the feelings they should show and the feelings they perceived as their own. She suggests to train target persons' skill of self-monitoring and self-evaluation by self-awareness. This is a good idea for further studies that work with videos in which emotions are displayed. The fact, that physiological data may be capable of transporting the displayed feelings more accurately is relevant for further studies, but should also be tested further in practice.

For future research, several ways of improvement could take place: an emotional period that is long enough to keep the reaction of the unusual event within this time window, and a rest phase between the salient event and the beginning of the cognitive period in order to not mix up the two phases and to avoid the reaction of the salient event occuring in the cognitive period.

As it was discussed, the cognitive side of the story may have more impact on the test subjects, which can be an explanatory approach for the characteristica of the phenomenon of self-other distinction. Studies have to keep the character of it in mind here. A specific and separated testing of the affective and cognitive aspects of self-other distinction would be a further innovation proposal.

The development and the improvement of stimuli to measure self-other distinction and empathic accuracy are important tasks in the research of social neuroscience, which is still a fairly young science. The importance of this research field is undisputed. To understand the mechanisms of empathy and their relatives like self-other distinction is of great relevance. To be treated with empathy and treat others with empathy can make our daily life interactions more gratifying. Empathy is not a stable trait, given by birth and not changeable. This also provides hope to those people who have psychopathic traits that they can train their empathic abilities. Therefore, trainings to develop own empathy skills are very interesting. If people lack self-other distinction and/or empathic accuracy, such videos could also be useful to train these skills.

This study led to further assumptions concerning the complexity of empathy and especially self-other distinction. It will be interesting to see to which findings further research in the field of social neuroscience will lead.

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