Showing personal interest and providing positive feedback: the effect on skin conductance

Author: Brianne van der Genugten
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT,

Today's rapidly changing business environment has encouraged organizations to adopt the agile way of working. Team dynamics have changed by dividing individuals into self-organized, multidisciplinary teams. Based on the shared leadership theory, these dynamics allow all individuals to portray leadership behavior. Leadership behavior can be classified amongst three categories: task-oriented, relations-oriented and change-oriented. An explorative research was performed to assess the effects of two specific components of relations-oriented behavior (accompanied with underlying positive emotions) on skin conductance responses (SCRs): *providing positive feedback* and *showing personal interest*. The verbal behavior and skin conductance activity of 67 individuals were observed using a video observation method during three different types of meetings within one sprint. Event-related electrodermal activity analysis was performed to identify SCRs of individuals related to behavior. Both quantitative and qualitative analyses were carried out to first assess the effects of both behaviors separately before finally taking them together to uncover whether they could be combined. It was found that individuals do not respond significantly more frequently, nor longer to one behavior than to the other. However, individuals do experience higher amplitudes in response to showing personal interest during retrospective meetings than they do in response to providing positive feedback. When demographics were accounted for, it was found that individuals operating in Marketing and Customer Services experience higher amplitudes than individuals operating in other areas. Simultaneously, individuals operating in Communications/Operations and IT tend to experience lower amplitudes than individuals in other areas. Furthermore, Dutch individuals experience lower amplitudes than individuals with other nationalities. Whereas little differences were found between both components of relations-oriented behavior, significant results were obtained after combining the data. Based on the initial findings, further research was recommended to assess the (to some extent similar) effects of providing positive feedback and showing personal interest on individuals.

Graduation Committee members:
MSc. R. Kortekaas
Prof. Dr. C. P. M. Wilderom

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1. INTRODUCTION

Markets are becoming more turbulent and volatile, whilst uncertainty is increasing through fast-changing economic and competitive forces (Christopher, 2000). Flexibility and speed are of critical importance for organizations operating in today's era. Several methods to increase team efficiency have been developed to aid organizations in effectively serving these changing markets, including *the agile way of working*. The agile way of working was initially developed to aid organizations in effectively facilitating change (Fowler & Highsmith, 2001). Whereas a large amount of recent studies have focused on finding ways to effectively implement agile as a management practice throughout an organization (Dikert, Paasivaara, & Lassanius, 2016), only few studies have focused on the micro behavioral patterns of individuals operating in organizations that lead to team effectiveness (Van Dun, Hicks, & Wilderom, 2017; Hoogeboom & Wilderom, 2019). Individuals that operate in agile organizations are generally assigned to multidisciplinary teams (Fowler & Highsmith, 2001). These teams operate according to a shared leadership model (Magpili & Pazos, 2018). Such a model allows multiple team members to hold equal responsibility and thus, interestingly, encourages all members to function as leaders occasionally (Scott-Young, Georgy, & Grisinger, 2019). This way of operating is quite different from the traditional model with a single leader that is often seen in organizations and allows us to analyze multiple individuals' verbal behavior from a leader perspective.

Verbal behavior can be divided into three meta categories to classify behavior that occurs in a meeting: task-oriented, relations-oriented, and change-oriented behavior (Yukl, Mahsud, Prussia, & Hassan, 2019). Historically, these meta categories have often been studied as a whole (e.g. to assess how task- and relations-oriented behavior affect individuals and teams). However, it is useful to more extensively analyze each group separately to see if specific components of the meta categories have different effects on individuals and up until now, literature has failed to sufficiently do so (Yukl et al., 2019). By analyzing them separately, it could possibly be determined whether further research is necessary to assess if components of the meta categories should be treated separately. Both *providing positive feedback* and *showing personal interest* can be categorized as specific positive relations-oriented components (Hoogeboom & Wilderom, 2019). In addition, both share characteristics with behaviors performed by transformational leaders (Bass, Avolio, Jung, & Berson, 2003), who are known for arousing strong emotions in their audience (Brief & Weiss, 2002).

Multiple methods are available to assess the effects of behavior on individuals. Because of the underlying emotions of relations-oriented behavior (and processes affecting these) that individuals are not consciously aware of, it is beneficial to use biological measures to accurately assess the effects of behavior on individuals (Cristopoulos, Uy, & Yap, 2019). Electrodermal activity (EDA) measurement devices and video observations can be combined to assess these effects in a highly objective manner. This method could provide literature with meaningful new insights since it has been underutilized by organizational scholars (Cristopoulos et al., 2019). EDA measurement devices allow us to measure skin conductance responses (SCRs) (Boucsein, 2012). The devices thus help determining the relationship between what people are saying and how this relates to their bodily responses (arousal levels), resulting in highly objective data. It can thus be discovered what the effects of providing *positive feedback* and *showing personal interest* are on individuals' arousal levels (and thus attention) during team meetings. The positive emotions underlying both verbal behaviors have been found to be associated with high levels of arousal (Boucsein, 2012). Both behaviors might thus result in SCRs during agile team meetings. However, SCRs resulting from both behaviors might affect individuals in a different way because of the words used to phrase them and the emotions underlying them. Literature has suggested that self-related positive phrases result in high arousal (Weis & Herbert, 2017), which is why *showing personal interest* might result in higher SCR amplitudes than *providing positive feedback*. Furthermore, positive words have been associated with SCRs (Lewis, Crithcley, Rotshtein, & Dolan, 2007), which is why one behavior might result in SCRs more frequently than the other based on the words used to phrase each. Even though these suggestions indicate that individuals might be affected differently by specific component behaviors, the current literature has yet failed to determine their effects on individuals.

1.1 Research objective and question

This research aims to make an assessment of the relationship between an individual's skin conductance responses (measured using EDA measurement devices) and two specific types of relations-oriented verbal behavior: *providing positive feedback* and *showing personal interest*. The effects that these behaviors have on individuals are assessed within this thesis. The primary objective is to explore whether the selected verbal behaviors induce SCRs. Furthermore, this thesis aims to determine whether differences occur between the SCRs (based on frequencies, amplitudes, latencies, and demographics) resulting from each behavior since both of them belong to the relations-oriented meta category of behavior. The following research question was developed to achieve these objectives:

What is the effect of showing personal interest and providing positive feedback (by person X) on the skin conductance responses of another individual (person Y) during agile team meetings?

The terms 'person X' and 'person Y' were used to clarify that this thesis aims to assess the effect that both behaviors have on *another* individual (who felt addressed by the behavior) than the one performing the behaviors. This was assessed without questioning whether the behavior was directed at the group in its entirety or at a particular individual specifically. Sub questions were developed to aid in answering the research question:

SQ1: What is the effect on the SCRs of an individual when another individual shows personal interest?

SQ2: What is the effect on the SCRs of an individual when another individual provides positive feedback?

Furthermore, a third sub question was developed to compare the two selected variables and see if differences occur between both:

SQ3: What are the differences and similarities between the SCRs of an individual as a result of providing positive feedback or showing personal interest by another individual?

1.2 Academic and practical relevance

1.2.1 Academic relevance

First and foremost, this research relies on a physiological observation method that captures the underlying processes of emotional affect and is difficult to influence by individuals in the sample. This allows us to accurately measure the extent of affect that individuals experience when verbal behavior is performed. Since this method has been underutilized in organizational research, this research is amongst the first studies that measures arousal in an organizational context for all individuals in a meeting (Cristopoulos et al., 2019). Furthermore, agile as a management practice is still a relatively new concept. Most research that has been performed focused on an organizational level (Dikert et al., 2016). However, information is lacking on individuals that operating in agile teams, especially with regards

to their behavior in practice. This research aims to contribute to filling this gap by focusing on verbal behavior characteristics that occur during agile team meetings on an individual level. Additionally, more insight on specific component behavior of the three meta categories of leadership behavior (task-oriented, relations-oriented, and change-oriented) has been called for (Yukl et al., 2019). Therefore, specific component behaviors of relations-oriented behavior were selected and compared.

1.2.2 Practical relevance
By uncovering which types of verbal behavior lead to desired responses, one can induce the desired response of individuals in certain situations by behaving in a particular manner. It has been established that SCRs are highly affective to attention (Akinola, 2010). It is therefore argued that, if individuals are affected by particular types of relations-oriented behavior more than others, managers could benefit from portraying these behaviors to increase individual attention at some points during meetings. On the other hand, it would be beneficial to know if certain verbal behaviors do not induce responses (and thus increase an individual's attention). If so, it will be known that performing these behaviors does not contribute to increasing an individual's attention and one might want to consider taking other measures. The way in which individuals are affected by both behaviors is objectively measured as individuals cannot influence their SCRs. This is especially valuable since effects of specific types of relations-oriented behavior were assessed separately. In addition, organizations and managers that are willing to introduce agile as a management practice can benefit from this research in the sense that they get a better understanding of actual individual behaviors that are common in team meetings and their effects on others.

1.3 Outline of this report
The next section of this report exists of a literature review. The methodology section is presented afterwards. Subsequently, results are reported and theoretical and practical implications, strengths and limitations, and recommendations for future studies are discussed. Finally, the research question will be answered, and a conclusion is drawn.

2. LITERATURE REVIEW
This section includes a literature review that starts with a discussion about *agile principles and team dynamics,* after which *a taxonomy of verbal behavior* is addressed, and one category is selected. Next, *relations-oriented behavior components* are searched for by reviewing several articles published on the subject. Finally, *electrodermal activity* is discussed to explain its usefulness as a measurement method and address the current insights on the effects of *relations-oriented behavior on SCRs.*

2.1 Agile principles and team dynamics
Agile is a relatively new concept that originates from the software and IT industry and was initially developed to accept and quickly manage change when facing challenges rather than relying on extensive up-front planning (Fowler & Highsmith, 2001; Dikert et al., 2016). The agile methodology knows several principles, including customer centricity and value creation, frequent product and process reviewal, and finding ways to facilitate and embrace change (Fowler & Highsmith, 2001). Organizations applying agile as a management practice generally assign individuals to versatile teams. Self-management, autonomy in decision-making, frequent review of effectiveness and progress, and face-to-face conversation are important agile team characteristics (Fowler & Highsmith, 2001). In addition, these self-managing teams exist of individuals that possess diverse skills and knowledge and work together to attain common goals (Magpili & Pazos, 2018). A feature of agile teams that is especially relevant for consideration in light of this

research is the aforementioned distribution of power. Power distribution amongst team members is done based on a shared leadership model, meaning that all members hold equal responsibility and thus function as leaders (Magpili & Pazos, 2018; Scott-Young et al., 2019). Such a shared leadership model maximizes the opportunity to benefit from the diversity of skills and knowledge that individual team members possess (Nicolaides, LaPort, Chen, Tomassetti, Weis, Zaccaro, & Cortina, 2014; Scott-Young et al., 2019). In addition, it has been found to increase team performance and enhance effectiveness (Nicolaides et al., 2014; Scott-Young et al., 2019). Because of this model, all members of an agile team are expected to portray behaviors that are traditionally performed by a team leader only.

2.2 Verbal behavior
It has been established that agile teams distribute power equally based on a shared leadership model, in which each team member behaves as a leader occasionally (Magpili & Pazos, 2018; Scott-Young et al., 2019). Since, this thesis aims to analyze behavior within agile teams, and all individuals are perceived as leaders, it is useful to examine the leadership behavior literature.

The field of leadership studies has provided multiple ways to classify behaviors (Behrendt, Matz, & Göritz, 2017; Yukl, Gordon, & Taber, 2002). A taxonomy was proposed that divides verbal behavior in three meta-categories: task-oriented behavior, relations-oriented behavior and change-oriented behavior (Yukl et al., 2002). Task-oriented behavior aims to improve efficiency and reliability of team activities. Relations-oriented behavior aims to ensure that members of a team are committed to their tasks, are confident and cooperate with one another. Finally, change-oriented behavior aims to identify, implement and sustain changes. All individuals within agile teams are assumed to verbally portray task-oriented, relations-oriented and change-oriented behavior.

Following up on a study on the previously defined meta-categories by Borgmann, Rowold & Bormann (2016), Yukl et al. (2019) emphasize a limitation originating from a lack of analysis on specific component behavior. They provide evidence that more extensive analysis of the effects of specific components of the three meta categories (rather than studying the categories as a whole) is likely to be more useful to understand effective leadership in different situations and develop management. It was therefore decided to assess individual team members' responses to *specific* types of behavior that fall within *one of the three* meta categories for this thesis. To address this limitation, one of the three categories was selected for analysis within this thesis to assess its components more closely: relations-oriented behavior. This decision was made based on a study performed by Hoogeboom and Wilderom (2019) on the relationship between a leader's skin conductance responses, task-oriented and relations-oriented leader behavior, and leader effectiveness. They found that especially positive and negative *relations-oriented behavior* are accompanied with high arousal in effective and non-effective leaders (Hoogeboom & Wilderom, 2019). It was aimed to explore whether this applies to all components of relations-oriented behavior together, or if one can find differences between them, which is why the next section includes a literature review focusing on the components of relations-oriented behavior.

2.3 Relations-oriented behavior components
It needs to be determined what exactly components of relations-oriented behavior are in order to analyze them. This section addresses overlaps in literature to determine what components of relations-oriented behavior are and how they are valuable for agile team members.

Yukl et al. (2019) state that specific relations-oriented behavior categories include supporting, developing, recognizing, rewarding and empowering. 'Supporting' behavior is used to show positive regard and build cooperative relationships (Yukl, 2012). For example, one can show concern for an individual's needs or feelings and express confidence. 'Developing' behavior is applied to increase the skills and confidence of others (e.g. by providing career advice or coaching someone). 'Recognizing' behavior is used to show appreciation. One can verbally express recognition by praising someone on his/her accomplishments. Furthermore, 'rewarding' can be done by presenting an award or recommending a pay increase. Finally, 'empowering' means giving others more autonomy over work decisions (e.g. by asking others for input or ideas).

Another way to look at relations-oriented behavior, is to make a separation between positive- and negative relations-oriented behavior (Hoogeboom & Wilderom, 2019). Whereas similar components to the ones described in the previous section are categorized as positive relations-oriented (e.g. individualized consideration, intellectual stimulation, providing positive feedback), antisocial leader behaviors are reflected in the negative relations-oriented category (e.g. interrupting and showing disinterest). Since different results have been obtained for both categories, this thesis will focus on positive relations-oriented behavior only, to make meaningful comparisons between the components. In a study on values and behaviors of effective lean managers, van Dun, Hicks and Wilderom (2017) also identified types of relations-oriented behavior. This study uses a set of identified components including active listening, agreeing, encouraging/enthusing, providing positive feedback, socializing and showing personal interest.

Finally, it is believed that leaders experiencing certain emotions are likely to transfer these to their followers (Brief & Weiss, 2002). This theory is especially evident in the transformational leadership theory. Some recent studies have suggested that

combining both transactional and transformational leadership with an organization's ability to adapt to its environment would increase the understanding of leader effectiveness (Antonakis & House, 2014; Rowold, 2014). Another suggestion that has recently been made (the augmentation effect) states that transformational leadership actually adds to the effect of transactional leadership (Judge & Piccolo, 2004). Nonetheless, transformational leadership continues to be at the center of leadership research (Zhu, Song, Zhu, & Johnson, 2019; Judge & Piccolo, 2004). Whereas transactional leaders emphasize the proper exchange of resources (Judge & Piccolo, 2004), transformational leaders focus on intrinsic value and use strong emotions to arouse similar emotions in their audience (Brief & Weiss, 2002). They are likely to portray relations-oriented behavior to achieve this. Additionally, transformational leaders are perceived to be more adaptive and flexible than traditional leaders and are thus better able to cope with rapidly changing environments (Bass et al., 2003). Since the agile methodology was developed initially to facilitate change and cope with changing environments (Fowler & Highsmith, 2001), especially behaviors performed by transformational leaders are likely to be effective for agile team members. The traditional transformational leadership behaviors are individualized consideration, inspirational motivation, intellectual stimulation and idealized influence (Bass et al., 2003).

Components used in the previously described studies on relations-oriented behavior and transformational leadership were added to Table 1 to determine which ones to select for this thesis. Comparing the four taxonomies in Table 1, one can clearly see overlaps between literature with regards to some components of verbal behavior. Based on these overlaps, two specific verbal behavior categories were selected. The selected behaviors are showing personal interest (**in bold**) and providing positive feedback (*in italic*).

Table 1. Taxonomies of relations-oriented behavior components and the verbal behavior categories selected for this thesis

Yukl (2012)		Hoogeboom & Wilderom (2019)		Van Dun et al., (2017)	Bass et al. (2003)	This thesis
Category	Example	Category	Example	Category	Category	Category
Supporting	**Showing concern for an individual's needs/feelings**	Positive relations-oriented	**Individualized consideration**	Active listening	**Individualized consideration**	**Showing personal interest**
Supporting	Providing support and encouragement	Positive relations-oriented	Intellectual Stimulation	Agreeing	*Inspirational Motivation*	*Providing Positive Feedback*
Supporting	Expressing confidence	Positive relations-oriented	Idealized influence behavior	Encouraging - enthusing	Intellectual Stimulation	
Supporting	Encouraging mutual trust/ building a relationship	Positive relations-oriented	*Providing positive feedback*	*Providing positive feedback*	Idealized Influence	
Developing	Providing career advice	Positive relations-oriented	humor	Encouraging - cooperating		
Developing	Coaching	Positive relations-oriented	Giving personal information	Socializing		
Recognizing	*Praising*	Negative relations-oriented	Interrupting	**Showing personal interest**		
Rewarding	Presenting an award	Negative relations-oriented	Showing disinterest			
Rewarding	Recommending pay increase	Negative relations-oriented	Defending one's own position			
Empowering	Asking others for ideas					

Note. Overlaps between the literature regarding relations-oriented behavior were scanned for. It was assessed which components were mentioned in the selected literature *and* had overlaps with transformational leadership behaviors. Consequently, showing personal interest (overlaps in all studies), providing positive feedback (overlaps in all studies), intellectual stimulation (overlaps in 3 out of 4 studies) remained. Finally, intellectual stimulation was dropped since it has been argued that this type of behavior belongs to the change-oriented category of behavior since it is similar to encouraging innovation (Yukl et al., 2019).

2.4 Electrodermal activity

In the previous section, two types of relations-oriented verbal behavior have been selected for this research: showing personal interest and providing positive feedback. Several methods can be used to assess the effects that these behaviors have on individuals

and how they respond to them. Of the small amount of studies that have analyzed the effects of behavior on individuals, most rely on surveys that asked individuals to describe behavior (Yukl et al., 2019). However, surveys can be influenced by individuals on whose opinions they rely and their personal interpretations of

the used concepts resulting in response bias. *A different*, more objective method capturing the underlying processes that an individual is not always consciously aware of was selected to assess the effects of providing positive feedback and showing personal interest on an individual: electrodermal activity (EDA) recording (Christopoulos et al., 2019). Applying such a method provides new insights whilst simultaneously avoiding bias that might result from surveys. This section will address what EDA recording is, what SCRs might indicate and what is known about the relationship between relations-oriented behavior and SCRs.

2.4.1 EDA recording and skin conductance

EDA recording is frequently used in the field of psychophysiology since it is a rather easy to use method of measuring changes in EDA using local processes in the skin (Boucsein, 2012). EDA recording has been applied to multiple research fields but only rarely in an organizational setting (Christopoulos et al., 2019; Hoogeboom & Wilderom, 2019), especially in such a new field as 'agile' in organizations. Electrodermal responses can be divided into two general categories that, in turn, may exist of subcategories: endosomatic (without external current) and exosomatic (with external current) (Boucsein et al., 2012). The most frequently used technique of EDA recording in practice falls within the exosomatic category: skin conductance (SC) measurement. This method of EDA measurement uses a direct current with constant voltage to capture variations in palmar sweat glands (Boucsein et al., 2012). Both *tonic* and *phasic* phenomena are measured. Tonic measurements resemble a baseline level of skin conductance that each individual possesses whereas phasic phenomena measure responses (increases or decreases in electrical activity) to certain stimuli (Benedek & Kaernbach, 2010; Boucsein, 2012).

The aforementioned phasic phenomena, or skin conductance responses (SCRs), are used for measuring phasic sympathetic activity (Benedek & Kaernbach, 2010). This activity serves as a biomarker for arousal and is associated with changes in emotional states (Cristopoulos et al., 2019; Boucsein, 2012). The term 'arousal' tells us about the extent of calmness and excitation, as experienced by an individual (Lewis et al., 2007). Thus, skin conductance measuring devices allow us to record and assess people's bodily responses to stimuli (in this case: being provided positive feedback and being shown personal interest) and use these as an index for their emotional state. In addition, SCRs have been found to be highly affective to changes in an individual's attention (Akinola, 2010), and learning experience (Hardy, Wiebe, Grafsgaard, Boyer, & Lester, 2013). Thus, an individual who experiences SCRs as a result of particular behavior, is likely to experience an increase in attention and effective learning because of this behavior as well. It is argued here that, if it is known which behaviors result in SCRs for individuals, organizations can use this information to raise an individual's attention during a meeting. Although attention and arousal are positively associated, precaution needs to be taken when drawing inferences on emotional states based on variability in electrical activity on its own since a peak in arousal can have several meanings (Boucsein, 2012). It was discovered early on that increases in arousal can be associated with varying emotional states, including excitement, anger, fear and distress (Russell, 1980; Boucsein, 2012). The term 'valence' is used to describe the extent to which emotional affect is positive or negative (Lewis et al., 2007). Studies have also shown that responses might be related to different types of stress (Akinola, Kapadia, Lu, & Mason, 2019). Thus, whereas it is known that uncovering which types of behavior lead to SCRs might help organizations in raising an individual's attention during meetings, further research is necessary if one wants to discover the valence of each identified SCR.

2.4.2 Relations-oriented behavior and SCRs

Some previous findings on relations-oriented behavior in combination with SCRs were explored to gain deeper insights. It was already mentioned earlier that both providing positive feedback and showing personal interest belong to the *positive* relations-oriented category (Hoogeboom & Wilderom, 2019). Both verbal behaviors have some overlaps with transformational leadership behaviors. Inspirational motivation can be executed by for example voicing positive regards, whereas individualized consideration can be shown by providing individuals with personalized attention (Bass, & Riggio, 2006). It has also been established that, in order to perform these behaviors, transformational leaders use strong emotions to arouse similar emotions in their audience (Brief & Weiss, 2002). In addition, positive words have been found to be associated with positive emotions (Weis & Herbert, 2017). It can therefore be argued that when these positive behaviors are performed by agile team members, positive emotions are likely to be underlying them and might be transferred to other individuals in a meeting.

Positive emotions have been found to be associated with high arousal and increased sympathetic activity (Bradley, Miccoli, Escrig, & Lang, 2008; Boucsein, 2012). SCRs are more likely to occur when individuals are faced with pleasant stimuli than they are when being faced with neutral stimuli (Bradley et al., 2008). It is therefore likely that both providing positive feedback and showing personal interest lead to increases in physiological arousal and thus SCRs. Hoogeboom & Wilderom (2019) have already found that this is the case for leaders' own skin conductance when performing relations-oriented behaviors themselves. Based on these findings, it seems plausible that this would also be the case for individuals at the receiving end of these behaviors. Thus, providing positive feedback and showing personal interest are both expected to induce relatively strong SCRs within another individual. Since the two have not yet been compared to one another directly, it is difficult to predict how they might differ from each other. It is not yet known whether one might result in more or stronger SCRs than the other. However, positive words have been associated with positive emotions (Lewis et al., 2007; Weis & Herbert, 2017), and these positive emotions are likely to result in SCRs (Bradley et al., 2008). Consequently, one behavior might result in SCRs relatively more often than the other does due to the fact that positive words may be more often used when phrasing one than the other. Furthermore, Weis & Herbert (2017) have suggested that self-related positive phrases might lead to higher arousal than other-related phrases do. Since showing personal interest is generally more related to a specific individual's self, this might indicate that stronger SCRs occur resulting from showing personal interest. Thus, although this has not been studied yet, other studies' findings suggest that differences in SCRs might occur between both selected relations-oriented verbal behaviors.

3. METHODOLOGY

To explore the effects of the selected verbal behaviors on skin conductance responses of individuals, a descriptive research was performed. The predominant proportion of this research consisted of a quantitative analysis. However, a short qualitative analysis was added to gather initial insights on events that caused multiple individuals to experience an SCR simultaneously.

3.1 Sample

This research applied data collection and analysis on an individual level. The individuals whose skin conductance and verbal behavior were assessed are employed by a large financial organization located in the Netherlands. This organization has applied agile as a management practice for approximately five years. Throughout this organization, individuals with different

demographics, skills and knowledge have been divided into multidisciplinary agile squads. Demographic data on the individuals (gender, area of expertise and nationality) was collected through surveys. On average, the individuals were 39.3 years old ($SD = 10.7$), 76.1% was male, and 66.7% was Dutch. Besides being familiar with the agile management practice, they have been working together as a squad for at least three months. The number of individuals per squad ranges from five to nine, with an average of 6.7 ($SD = 1.3$). A total of 67 individuals was observed. Some individuals' data ($N = 4$) had to be eliminated from the sample since they either experienced no SCRs at all (non-responders) or only one to two SCRs were recorded. The squads operate in so-called sprints. Within each sprint, the individuals have three types of meetings: planning, refinement and retrospective. Data from all three meetings ($N = 23$) was collected to take differences between meetings into account.

3.2 Data collection

Prior to the analysis, data was collected on the two selected relations-oriented verbal behavior components: showing personal interest and providing positive feedback. This data was collected through video observation methods that use the Observer XT software (version 15). All collected video observations were coded using a verbal behavior codebook that was developed by the Change Management and Organizational Behavior department of the University of Twente. This codebook divides verbal behavior into mutually exclusive categories. Included in this set of mutually exclusive categories are showing personal interest and providing positive feedback. Table 2 shows examples of used phrases to express each behavior verbally.

Table 2. Verbal expressions of behavior categories

Meta Behavior Category	Specific Behavior Category	Examples
Relations-oriented (Yukl et al., 2019)	Showing personal interest	"How are you doing?" "Could I help you with that?" "Good to know you are feeling better"
Relations-oriented (Yukl et al., 2019)	Providing Positive Feedback	"Well done!" "Thank you" "Good idea"

To ensure that bias was minimized whilst coding, each video was coded by two students independently (resulting in two event logs). Both event logs were then compared to create a final event log. During the recorded meetings both providing positive feedback ($N = 289$) and showing personal interest ($N = 86$) behaviors occurred. During a meeting, positive feedback was provided 12.5 times on average ($SD = 13.6$), whereas personal interest was shown only 3.7 times on average ($SD = 6.3$).

In addition, data was collected on the individuals' tonic and phasic skin conductance activity. This data was collected using the BIOPAC (hardware device MP160) system. BIOPAC devices use EDA transmitters to send skin conductance data to the software they are connected to (AcqKnowledge, version 5.0.5). Each transmitter uses two electrodes that were attached to the palmar skin of an individuals' hand to gather and save skin conductance data. This was decided to minimize obtrusiveness of the meetings by the devices (Boucsein, 2012). The electrodes were attached to an individual's non-dominant hand since this decreases the probability of biased data. The transmitters were numbered and linked to an employee's number used in the aforementioned video observations, which made it possible to connect EDA data to a specific individual. After raw data was collected, the function 'Slew Rate Limiter' was applied to remove any noise and motion artifacts from the data (e.g. those caused by an individual hitting the table with his hand during the meeting). Slew Rate Limiter is a function provided by the BIOPAC AcqKnowledge (version 5.0.5) software that allows one to set the allowable rate of change of a signal by selecting a

desired window that ranges from a minimum allowable amount of change to a maximum allowable amount of change (BIOPAC Systems, Inc., 2019). This means that artifacts that exceed the allowed window are automatically removed. To create the dataset, event-related EDA analysis was performed using AcqKnowledge. This function automatically locates stimulus events and identifies SCRs (which pass a certain threshold) that occur within a set timeframe (latency window). The threshold used to determine whether an increase in skin conductance activity actually counted as an SCR was set to 0.02μS (micro siemens). Although historically, thresholds of 0.05μS were most commonly used, technological advances and increases in precision have made it increasingly common and preferred in literature to use thresholds ranging from 0.01μS to 0.03μS (Braithwaite, Watson, Jones, & Rowe, 2013). Therefore, a threshold falling within this range was selected. SCRs that were found were linked to parts of the video recordings that occurred up to 4 seconds earlier and thereby linked to verbal behaviors. A latency window between 1 and 4 seconds was used since this is the most frequently used window in practice (Boucsein, 2012). The resulting dataset of SCRs included the SCR amplitudes and latencies. The SCR amplitude is the change in tonic EDA from the moment the set threshold is passed to the SCR peak, whereas the SCR latency is the duration of the SCR (Braithwaite et al., 2013). A manual check was performed to see which person was performing the behavior (person X) at the time that the response occurred (for person Y). Responses that resulted from an individual's own behavior were removed from the dataset. From the resulting 379 SCRs that were found, one had to be removed since its amplitude was a clear outlier in comparison to those of the rest of the sample (amplitude > 15 whereas all other amplitudes < 2). This was likely due to a technical issue.

3.3 Analysis methods

Several tests were selected to answer the research question. First, the frequency (%) of a particular behavior leading to at least one SCR was assessed to see whether each behavior resulted in SCRs and to relatively compare both behaviors. In other words, when multiple individuals experienced an SCR due to the same event, this was counted as one, responded to, event. Since both variables are dichotomous and the expected value for each cell was larger than 5, a chi-square test of independence was performed to assess whether there is a relationship between the type of behavior and the likelihood of response occurrence. After comparing both behaviors, a Chi-Square goodness of fit test was performed after combining them to assess whether relations-oriented is equally likely to result in a response as it is to result in a non-response. This test uses expected values and compares them to the actual values found to assess if there is a significant difference. In this case, it was tested whether the distribution between responses and non-responses significantly differed from 50/50 (which would mean that the probability of response occurrence is equal to the probability of non-response occurrence). Two hypotheses were formulated to assess this (H_0 = relations-oriented behavior does not affect SCRs, and H_A = relations-oriented behavior does affect SCRs). Next, mean amplitudes and latencies of SCRs resulting from both behaviors were assessed and compared. Since both behaviors are performed independently, and amplitudes and latencies are both scale variables, two independent samples t-tests were performed. Prior to conducting these tests, the gathered data was checked for skew and kurtosis. The window used to determine if the data was acceptable ranged from -1.0 to 1.0 for skew and from -2.0 to 2.0 for kurtosis (George & Mallery, 2010). Initially, both skew and kurtosis fell outside of the acceptable range for the amplitude data (skew = 3.661 and kurtosis = 20.286). Therefore, a log transformation was performed. This transformation filters out the individual

differences that influence SCR amplitudes to ensure that the data can be compared (Braithwaite et al., 2013). After the log transformation, skew and kurtosis were acceptable (skew = -.368 and kurtosis = -.363). The latency data already fell within the acceptable range. Next, the type of meeting was considered by comparing relative frequency of SCRs resulting from both behaviors per type of meeting. Since three types of meetings were analyzed in the sample (categorical variable with more than two groups), a one way ANOVA test was performed to assess whether differences occurred between the mean amplitudes of SCRs per type of meeting. Finally, demographics of the involved individuals were considered. The effect of gender on an SCR was assessed first by using *t*-tests to look for differences between males and females. Next, the area of expertise of individuals was considered by performing a one way ANOVA test to assess differences between groups (area of expertise consisted of 5 groups with $N > 15$: Marketing & Customer Services, IT, Risk, Finance & Accounting and Communications/Operations; all other areas were added to 'Other'). At this point, data from providing positive feedback and showing personal interest could not be assessed separately since the latter sample of responses was too small to create normally distributed groups. Independent samples *t*-tests were performed to assess if individuals with particular areas of expertise experienced significantly different SCR amplitudes than others. This was also done to assess if Dutch individuals experienced different SCR amplitudes than individuals with other nationalities. Unless stated otherwise, the alpha used to determine whether a result is statistically significant is .05. Finally, a short qualitative analysis was performed to assess which phrases were used when more than one individual responded to a particular event in comparison to those phrases used when only one or zero did. Thematic analysis was applied to identify, analyze, and report themes from the data (Braun & Clarke, 2006). Six steps developed by Braun and Clarke (2006) were applied to systematically perform thematic analysis: 1. Familiarising yourself with the data, 2. Generating initial codes, 3. Searching for themes, 4. Reviewing themes, 5. Defining and naming themes, and 6. Producing the report.

4. RESULTS

This section starts with the outcomes of the quantitative tests. The frequency of SCR occurrence as a result of both behaviors is discussed first, after which they were compared based on amplitudes and latencies. Next, the data from different meetings was compared and the effects of several demographics on an individual's SCRs were assessed. When possible, the behaviors were assessed separately to check for differences and similarities. If not possible, data of both behaviors was combined. The results section ends with a short qualitative analysis.

4.1 Quantitative analysis

4.1.1 Comparing SCR frequencies

Table 3 shows the frequency distribution for responses and non-responses that occurred each time a behavior was performed. When assessing frequencies, providing positive feedback resulted in at least one SCR 59.9% of the time ($N = 173$). In comparison, showing personal interest resulted in at least one SCR 57.0% of the time ($N = 49$). Thus, numerically, providing positive feedback seemed to induce SCRs more frequently than showing personal interest did. A chi-square test of independence was performed to examine whether there is a significant relationship between the type of behavior that was performed and the likelihood that an SCR will occur. Not enough evidence was found to conclude that the number of SCRs found significantly differs per type of behavior, X^2 (1, $N = 375$) = .228, $p = .633$. Therefore, it cannot be concluded that the frequencies of SCR occurrence differ between the two behaviors.

Table 3. Responses and Non-Responses

		Response		Non-Response		Total	
		N	%	N	%	N	%
Behavior	Providing positive feedback	173[a]	59.9%	116	40.1%	289	100.0%
	Showing personal interest	49[a]	57.0%	37	43.0%	86	100.0%
Total		222[a]	59.2%	153	40.8%	375	100.0%

Note. If multiple individuals experienced an SCR resulting from the same event, this is counted as a response to one event. [a]

After no differences were found between the frequency of responses for both behaviors, they were combined to assess whether it could be concluded that there is a relationship between both *relations-oriented behavior* and SCRs in general. This was expected based on the finding that leaders experience SCRs as a result of performing relations-oriented behavior (Hoogeboom & Wilderom, 2019), and similar were expected for their audience. Based on the outcome of the Chi-Square goodness of fit test, the null hypothesis, being that relations-oriented behavior does not affect SCRs, was rejected, X^2 (1, $N = 375$) = 12.696, $p < .001$. Thus, enough evidence was found to conclude that performing relations-oriented behavior affects individuals' SCRs.

4.1.2 Comparing SCR amplitudes and latencies

To further compare both behaviors, a closer look was taken at the details of each specific SCR that appeared. To do so, the logarithmized *amplitudes* resulting from both behaviors were compared. The SCRs resulting from providing positive feedback ($N = 299$) were associated with a logarithmized amplitude $M = -1.1261$ ($SD = .49802$). By comparison, the SCRs resulting from being shown personal interest ($N = 79$) were associated with a numerically larger logarithmized amplitude $M = -1.1158$ ($SD = .57101$). To test whether the SCRs resulting from both behaviors were associated with statistically significantly different mean amplitudes, an independent samples t-test was performed. All normality requirements were met and the t-test was performed after the log transformation was done for both providing positive feedback (skew = -.465 and kurtosis = -.413) and showing personal interest (skew = -.127 and kurtosis = -.326). The t-test was not associated with a statistically significant effect, $t(376) = -.159, p = .874$. Thus, there was not enough evidence to conclude that the mean amplitudes of SCRs resulting from being provided with positive feedback and being shown personal interest are significantly different from each other. An independent samples *t*-test was performed to check whether any differences with regards to *SCR latency* per type of behavior could be found. The distributions for both providing positive feedback (skew = -.517 and kurtosis = -.820) and showing personal interest (skew = -.313 and kurtosis = -1.071) were sufficiently normal to perform the independent samples t-test. The SCRs resulting from providing positive feedback ($N = 299$) were associated with latency $M = 2.8510$ ($SD = .85608$). By comparison, the SCRs resulting from being shown personal interest ($N = 79$) were associated with a numerically shorter latency $M = 2.7967$ ($SD = .86064$). Again, the t-test was not associated with a statistically significant effect, $t(376) = .500, p = .617$. Therefore, not enough evidence was found to conclude that the mean latencies of SCRs resulting from both behaviors differ from one another.

4.1.3 Comparing different meetings

Table 4 shows the frequency distribution for SCRs per meeting resulting from providing positive feedback and showing personal interest. The data shows that providing positive feedback resulted in an SCR relatively most often (65.4% of the time) during a planning meeting ($N = 53$) and least often (53.7% of the time) during a refinement meeting ($N = 29$). The difference was not found to be statistically significant, X^2 (2, $N = 289$) = 1.936, $p = .380$. Showing personal interest resulted in an SCR most often

(62.1% of the time) during a planning meeting ($N = 18$) and least often (52.6% of the time) during a retrospective meeting ($N = 20$). This difference was not found to be statistically significant either, X^2 (2, $N = 86$) = .606, $p = .739$.

Table 4. Responses and Non-responses per meeting

Behavior	Meeting	Response N	%	Non-Response N	%	Total N	%
Providing positive feedback	Planning	53[a]	65.4%	28	34.6%	81	100.0%
	Refinement	29[a]	53.7%	25	46.3%	54	100.0%
	Retrospective	91[a]	59.1%	63	40.9%	154	100.0%
	Total	173[a]	59.9%	116	40.1%	289	100.0%
Showing personal interest	Planning	18[a]	62.1%	11	37.9%	29	100.0%
	Refinement	11[a]	57.9%	8	42.1%	19	100.0%
	Retrospective	20[a]	52.6%	18	47.4%	38	100.0%
	Total	49[a]	57.0%	37	43.0%	86	100.0%

Note. If multiple individuals experienced an SCR resulting from the same event, this is counted as a response to one event. [a]

Furthermore, one way ANOVA was applied to assess whether significant differences could be found in mean amplitudes of the SCRs based on the type of meeting that the SCR took place in. The descriptive statistics associated with SCR logarithmized amplitudes per meeting are shown in Table 5 for both behaviors. Skew and kurtosis were deemed acceptable for all categories (see Table 5). In order to test the hypothesis that the type of meeting had an effect on the SCR amplitude, a between-groups ANOVA was performed for both behaviors separately. First differences between meetings were assessed for providing positive feedback. The assumption of homogeneity of variances was tested based on Levene's F test, $F(2, 296) = .024$, $p = .977$. Since $p > 0.05$, the assumption was satisfied. The independent between-groups ANOVA did not yield a statistically significant effect $F(2,296) = .394$, $p = 0.675$. Thus, not enough evidence was found to conclude that individuals in the sample respond differently to providing positive feedback based on the type of meeting. The same test was performed to assess the data for showing personal interest. Levene's F test, $F(2, 76) = 1.053$, $p = .354$ was again satisfied. This time, the independent between-groups ANOVA did yield a statistically significant effect $F(2,76) = 4.120$, $p = 0.02$. Thus, the null hypothesis of no differences was rejected and some proportion of the variance in amplitudes for showing personal interest was accounted for by the type of meeting. Thus, whereas individuals seem to respond similarly to *providing positive feedback* throughout all meetings, individuals seem to experience stronger responses because of *showing personal interest* in the retrospective meeting then they do in the refinement and planning meeting. Next, the two behaviors were compared to one another by performing an independent samples *t*-test, taking into account the mean amplitudes per meeting. Equal variances could be assumed in both cases. Based on the outcomes, not enough evidence was found to conclude that individuals' SCRs as a result of both behaviors differ in the planning meeting ($p = .139$), and in the refinement meeting ($p = .572$). However, enough evidence was found to conclude that individuals experience stronger responses to showing personal interest than to providing positive feedback in the *retrospective* meeting with $t(198) = -2.144$, $p = .033$.

Table 5. Logarithmized amplitudes per type of meeting

Behavior	Meeting	N	M	SD	Skew	Kurtosis
Providing positive feedback	Planning	90	-1.1082	.49507	-.513	-.666
	Refinement	41	-1.1889	.47638	-.489	-.952
	Retrospective	168	-1.1204	.50640	-.455	-.163
	Total	299	-1.1261	.49802		
Showing personal interest	Planning	31	-1.2575	.43934	-.133	-1.082
	Refinement	16	-1.2711	.52639	.154	-1.316
	Retrospective	32	-.9008*	.64753	-.752	.619
	Total	79	-1.1158	.57101		

Note. The mean amplitude for the retrospective meeting differs from the planning meeting significantly with $p < .05$ and from the refinement meeting with $p < 0.1$.*

4.1.4 Comparing different demographics

Several demographics that could potentially influence SCRs were reviewed next. First, it was assessed how often females responded to both behaviors on average in comparison to males. Table 6 contains the average frequency of SCRs experienced by males and females as a result of each behavior. The frequencies were standardized to percentages (relative to how often the behavior occurred in a meeting) to be able to compare them. Based on the numerical averages, females seem to respond more often to providing positive feedback than males. Simultaneously, males seem to experience SCRs relatively more often when being shown personal interest than females. Two independent samples *t*-tests were performed to assess whether these frequencies differed significantly. Skew and kurtosis fell within the acceptable range and homogeneity of variance could be assumed. Not enough evidence was found to suggest that the average frequency that males and females respond to providing positive feedback $t(61) = .90$, $p = .928$, differs from showing personal interest $t(35) = -.157$, $p = .876$. In other words, it cannot be said that males' and females' tendency to respond significantly differs per type of relations-oriented behavior. Combining both behaviors and assessing them as *'relations*-oriented' did also not provide statistically significant results, $t(62) = -.240$, $p = .811$. In addition, no statistically significant results were found to conclude that the mean logarithmized amplitudes and latencies differ per type of behavior between females and males.

Table 6. Frequency of SCR occurrence male/female

Behavior	Gender	N	M	SD	Skew	Kurtosis
Providing positive feedback	Female	13	.1567	.14052	.704	-.485
	Male	50	.1532	.11868	.877	1.102
	Total	63	.1539	.12229		
Showing personal interest	Female	11	.1022	.14802	1.134*	-.062
	Male	26	.1096	.12637	.626	-1.012
	Total	37	.1074	.12888		

Note. The skew of this group falls within a 2*SE range and was therefore deemed acceptable even though it appears to be largely skewed (SE = .661).*

To further assess whether demographics influence the SCR of an individual, a one way ANOVA test was performed to assess whether statistically significant differences in mean logarithmized amplitudes occurred for individuals with different areas of expertise. This could not be assessed separately for the two behaviors since the sample for showing personal interest was not large enough to result in sufficiently normally distributed groups ($N < 15$ for most groups). The descriptive statistics associated with logarithmized SCR amplitudes for individuals with different areas of expertise are shown in table 7. Individuals within the 'Communications/ Operations' area of expertise were associated with the numerically lowest mean amplitude ($M = -1.2966$), whereas individuals within Marketing & Customer Services were associated with the numerically highest mean amplitude ($M = -.9385$). To test the hypothesis that the area in which an individual operates affects the SCR amplitude, a between-groups ANOVA was performed. All the groups' skew and kurtosis were acceptable (see Table 7). Furthermore, the assumption of homogeneity of variances was tested based on Levene's F test, $F(5, 350) = 2.780$, $p = .018$. Since $p < .05$, the assumption was violated. It was then tested to see if ANOVA results were still significant when adjusted to account for unequal variance using a Welch test and a Brown-Forsythe test. Both tests resulted in p-values < 0.05 and were thus satisfied. The independent between-groups ANOVA yielded a statistically significant effect $F(5,350) = 3.040$, $p = .011$. Thus, the null hypothesis, being that no differences in mean amplitudes of individuals with different areas of expertise exist, was rejected and some proportion of the variance in amplitudes was accounted for by an individual's area of expertise. The Post-Hoc Tests showed that mean amplitudes of individuals with *Marketing &*

Customer Services as their area of expertise significantly differed from those within IT ($p = .014$) and Communications/Operations ($p = .009$). Thus, individuals experience statistically significantly higher SCR amplitudes when they operate in Marketing & Customer Services then they do when operating in IT or Communications/ Operations.

Table 7. Logarithmized amplitudes per area of expertise

	N	M	SD	Skew	Kurtosis
Marketing & Customer Services	56	-.9385	.36023	-.800	-.271
IT	92	-1.2071	.53013	-.295	-.449
Risk	30	-1.1363	.56816	-.113	-.698
Finance & Accounting	118	-1.1413	.46766	-.238	-.684
Communications/Operations	35	-1.2966	.49912	-.457	-.901
Other [a]	25	-1.1317	.48089	-.060	-1.576
Total	155	-1.0747	.56176		

Note. 'Other' includes Data Science, Interaction Design, Modelling and Coaching.[a]

To further assess whether individuals operating in Marketing & Customer Services can be separated from all other areas of expertise based on (logarithmized) mean amplitude differences, an independent sample *t*-test was performed. A dummy variable was created, and skew and kurtosis were deemed acceptable for both the Marketing & Customer Services group (skew = -.800 and kurtosis = -.271) and the 'Other' group (skew = -.260 and kurtosis = -.443). The SCRs experienced by individuals with the former area of expertise ($N = 56$) were associated with a logarithmized amplitude $M = -.9385$ ($SD = .36023$). By comparison, the SCRs experienced by individuals from the 'Other' group ($N = 322$) were associated with a numerically smaller logarithmized amplitude $M = -1.1562$ ($SD = .52937$). To test for differences, an independent samples t-test was performed. Levene's F test resulted in $p = .001$, so equal variances could not be assumed. The t-test was associated with a statistically significant effect, $t(101.614) = -3.855$, $p < .001$. Thus, there is enough evidence to conclude that the mean amplitudes of SCRs differ between individuals operating in Marketing & Customer Services and individuals operating in other areas of expertise and that individuals operating Marketing & Customer Services experience higher SCR amplitudes on average. A similar result was found when creating a dummy for the Communications/Operations group and performing an independent samples *t*-test to compare if this group differed from the rest. (Levene's $F = .017$, $p = .897$.) The t-test was associated with a statistically significant effect, $t(376) = 2.098$, $p = .037$. Individuals with this area of expertise do thus experience weaker SCRs than others. When using a *t*-test for individuals operating in IT (Levene's $F = .417$, $p = .519$), the t-test resulted in $t(376) = 1.792$, $p = .074$. Although not significant at an alpha of .05, this result was reported for future studies to be able to consider this. To conclude the quantitative analysis, it was assessed whether mean logarithmized amplitudes differed between Dutch individuals and individuals with other nationalities. Both behaviors were assessed together since the sample for showing personal interest consisted of too little ($N = 4$) individuals with other nationalities. An independent sample *t*-test was performed. A 'Dutch' dummy variable was created, and all other nationalities were classified as 'Other'. Skew and kurtosis were deemed acceptable for both the Dutch group (skew = -.327 and kurtosis = -.655) and the 'Other' group (skew = -.222 and kurtosis = -1.093). The SCRs experienced by Dutch individuals ($N = 277$) were associated with a logarithmized amplitude $M = -1.1670$ ($SD = .48115$). By comparison, the SCRs experienced by individuals from the 'Other' group ($N = 61$) were associated with a numerically larger logarithmized amplitude $M = -1.0266$ ($SD = .48174$). The independent samples t-test was associated with a statistically significant effect, $t(336) = 2.062$, $p = .040$. Thus, there is enough evidence to conclude that the mean amplitudes of SCRs are different between Dutch individuals and individuals

with other nationalities and that Dutch individuals experience lower SCR amplitudes on average.

4.2 Qualitative analysis

Sometimes, providing positive feedback or showing personal interest during a meeting caused a group of individuals ($N > 1$) to experience an SCR. Since it is interesting to uncover what exactly was said at such a time that caused multiple individuals to respond, a shorter qualitative analysis was performed. Positive feedback resulted in multiple responses 121 times (41.9% of the time) and showing personal interest led to multiple responses 29 times (33.7% of the time). Besides resulting in multiple SCRs more frequently, the maximum relative percentage of respondents was 71.4% for providing positive feedback, whereas it was 42.9% for showing personal interest. It thus seems that providing positive feedback is more suitable for gathering the attention of a group. Table 8 (Appendix) shows some of the phrases that were used when positive feedback was provided, and personal interest was shown that caused multiple individuals to respond. The number of individuals that experienced an SCR due to the same event and the relative percentage were also included. Table 8 shows that phrases leading to multiple SCRs for providing positive feedback can be divided into four main themes. The first theme focuses on emphasizing the positive words by using adverbs like *very, really, extremely, truly, incredibly* etc. The second theme exists of phrases that are pronounced with exclamation. The third theme includes phrases that address the entire team by using words like *we, all of us,* and *everyone*. Finally, the fourth theme consists of long sentences. Table 9 shows phrases that resulted in either a single or zero respondent(s). For providing positive feedback, three themes were identified. The first theme includes one- or two-word phrases that were not pronounced with exclamation (e.g. *"Nice."* or *"Good."*). The second theme of phrases was expressed in an agreeing manner. Individuals pronounced them as if they agreed with a suggestion made by someone else, using words like *yeah* and *also*. Thirdly, a set of phrases emphasized the word *I,* clearly expressing that it was someone's opinion. Since the sample for showing personal interest was a lot smaller, it was more difficult to scan for themes between phrases for this behavior. Nevertheless, some initial suggestions were made. Table 8 shows two identified themes for showing personal interest phrases that led to multiple respondents. The first theme includes phrases that, similar to the first theme of providing positive feedback, include adverbs like *really* and *very*. The second theme uses long questions. When short questions were used, either zero or one response(s) were found (Table 9).

5. DISCUSSION
5.1 Theoretical implications

Extending the findings of Hoogeboom & Wilderom (2019) with regards to leaders' arousal, both providing positive feedback and showing personal interest have been found to significantly affect SCRs for individuals in an audience as well. Individuals in the sample responded relatively less often to being shown personal interest than they did to being provided with positive feedback. This coincides with the fact that positive words are more frequently used when providing positive feedback than showing personal interest. Positive words are associated with positive emotions (Lewis et al., 2007; Weis & Herbert, 2017), which are in turn associated with SCRs (Bradley et al., 2008). In addition, the numerical mean amplitude resulting from *showing personal interest* was higher than the one for providing positive feedback. This is in accordance with the suggestion that individuals experience higher arousal when words are related to oneself (Weis & Herbert, 2017). However, the quantitative analysis did not provide enough evidence to conclude that differences

between frequencies, amplitudes (except during the retrospective meeting) and latencies of SCRs resulting from both types of behavior are significant. This indicates that the positive emotions underlying both relations-oriented behaviors (Brief & Weiss, 2002) arouse similar bodily responses for an audience, regardless of the different language used to phrase them. Furthermore, both behaviors resulted in an SCR most often in the planning meeting. This suggests that individuals are more responsive during initial project stages. Whereas, individuals' SCR strength was similar in all three meetings for *providing positive feedback*, they responded significantly stronger to *showing personal interest* during the retrospective meeting. Based on the aforementioned findings, it seems that the effects of both behaviors on individuals are similar to some degree but also show some differences. It thus remains questionable whether both specific relations-oriented verbal behavior categories should be assessed separate from one another (Yukl et al., 2019) or can be taken together. Further research is recommended to assess this.

SCRs have been associated with an increase in attention (Akinola, 2010) and learning experience (Hardy et al., 2013). Consequently, the findings of this research suggest that providing positive feedback and showing personal interest could potentially be used to increase the attention and positively affect the learning process of individuals during a meeting. Although these effects might be positive, one can imagine that an individual does not benefit from an unlimited amount of arousal peaks. Evidence has been found to support the so-called inverted-U hypothesis when it comes to *levels* of arousal in relation to flow (Peifer, Schulz, Schächinger, Baumann, & Antoni, 2014; Chin & Kales, 2019) and to performance (Boucsein, 2012). This hypothesis suggests that individuals will experience a state of flow at a *moderate level* of arousal (Peifer et al., 2014). Peifer et al. (2014) conceptualize flow-experience as "a pleasant state of absorption of a person during an optimally challenging activity" (p. 62). During this experience, the individual's skills and the activity's demands are balanced out. Arousal *levels* should ideally be raised to a moderate level (under challenging circumstances) since an individual will then neither experience boredom (which occurs when arousal is too low), nor stress (which occurs when arousal is too high). However, since the maximum level of arousal varies on an individual level (Boucsein, 2012), the stimulation necessary to reach a moderate state of arousal should be determined on an individual level as well. Although this applies to the level of arousal, it seems plausible that a similar pattern can be found when it comes to SCRs (or phasic sympathetic activity). The literature has (to the writer's knowledge) not yet come up with an amount of arousal stimulation that allows the 'average' individual to reach a moderate state.

Literature has suggested that electrodermal activity differs between male and female individuals (Boucsein, 2012). The findings of this research suggest that both behaviors are likely to result in similar responses, regardless of the gender of the individuals in the audience. Next, performing both behaviors affects individuals with a *Marketing & Customer Services* area of expertise more than individuals with other areas of expertise. Following up on this finding, literature shows that the extraversion trait of personality contributes to predicting whether individuals will choose a profession in marketing (Kothari & Pingle, 2015). Marketing employees are more well suited to the job when being extraverted (Leng & Chin, 2016) and this might contribute to the fact that they show different skin conductance responses than others. This is in accordance with the idea that extraverted individuals are more susceptible to positive reward than introverted individuals are (Boucsein, 2012). Since it was found that individuals with an *IT or Communications/ Operations* area of expertise tend to respond weaker to both

behaviors, this might indicate that they possess different personality traits. In addition, both behaviors arouse stronger responses for individuals that do not have a *Dutch nationality*. Given that the largest part of the individuals with 'other' nationalities is Asian, this actually contradicts with the idea that Asian individuals are more likely to be in low arousal emotional states (Lim, 2016).

5.2 Practical implications

Some practical implications were developed based on the findings of this research. First and foremost, showing personal interest and providing positive feedback *do* both affect an individual's SCRs and can thus be used to raise attention and facilitate learning during a meeting. Thus, if an individual is losing attention or focus, providing him/her with positive feedback or showing him/her personal interest is likely to help gather attention again. However, this should not be done too often since increasing arousal to a 'high' (which differs per individual) extent is likely to result in stress. Even though both behaviors seem to have similar effects on individuals, showing personal interest behavior was performed much less often (on average) in practice ($M = 3.7$) than providing positive feedback behavior was ($M = 12.5$). Teams could potentially benefit from portraying *showing personal interest* behavior *more often,* especially since showing personal interest results in higher amplitudes on average during retrospective meetings. It should also be considered that both behaviors affect non-Dutch individuals and those operating in Marketing & Customer Services most. It seems thus more suitable to direct these behaviors at these particular individuals (even though they are more likely to result in a response than in a non-response for all individuals in the sample). In addition, if it is aimed to engage multiple individuals simultaneously, it is recommended to *provide positive feedback* (rather than showing personal interest) and use words that include the entire group (*we* rather than *I* or *You*), emphasizing adverbs (e.g. really, very, truly etc.), long phrases (rather than short) and pronounce sentences with exclamation. Finally, it is recommended to ensure that the meeting environment remains challenging so that individuals can reach an optimum peak of flow-experience (Peifer et al., 2014).

5.3 Strengths and limitations

The greatest strength of this research, which contributes to its overall *reliability* and *validity*, is that opinions of individuals in the sample were not relied on. Behavioral data was collected and coded in a reliable and objective manner by using a video observation method (Haidet, Tate, Divergilio-Thomas, Kolanowski, & Happ, 2009). Data was coded by multiple students independently, which resulted in two (correlated) event logs that were afterwards combined. A detailed codebook existing of mutually exclusive categories that was built on theoretical constructs was used to ensure internal consistency whilst coding. Furthermore, data on individual arousal was gathered by attaching EDA measurement devices to the palmar skin of an individual's non-dominant hand, which reduced meeting obtrusiveness and data bias (Boucsein, 2012). Data was thus gathered at the exact moment (and location) a behavior was performed and did not rely on an individual's recall of the situation or understanding of the behavioral concepts used. Motion artifacts and outliers were also removed from the data to increase reliability (Boucsein, 2012). Finally, before performing any tests, the data had to be deemed acceptable in terms of skew, kurtosis, and homogeneity of variance.

Even though multiple strengths have been identified, this research had some limitations that should be noted. First of all, halfway through the data collection process, the coronavirus prevented further collection of observational data, which is why

a limited number of meetings was recorded and no data could be gathered since March 2020. Partially due to this fact, the sample of individuals was relatively small ($N = 67$). This caused some issues, especially with regards to the number of SCRs that were found resulting from showing personal interest ($N = 49$). Showing personal interest behavior only occurred 86 times during all meetings and therefore rarely occurred in comparison to other verbal behaviors (providing positive feedback occurred 289 times, which is three times as much). This might have contributed to the fact that no significant differences were found between mean amplitudes and latencies resulting from providing positive feedback and showing personal interest. Especially when different meetings are taken into account, it seems that a larger dataset could result in significant differences. Due to this, the demographic analyses could not be performed for both behaviors separately since the sample for showing personal interest was too small to show significant results and normal distributions. In addition, this research did not take into account at who (a group or an individual) the particular behavior was addressed but only looked at the impact of the behaviors in general. Finally, it was stated already in the literature review section of this report that further research is necessary to uncover the valence of an arousal peak (Boucsein, 2012). It can thus not be determined solely based on this research whether the fact that some individuals experience weaker/stronger SCRs than others should be perceived as good or bad. Still, it is argued that the SCRs found in this research were generally positive, because of the positive emotions underlying the selected behaviors.

5.4 Recommendations for further research

Firstly, it is recommended to perform this research again with a larger sample size. It is also suggested to compare more than two positive but also *negative* (to see if it is really the positive emotions underlying both behaviors that affect individuals) relations-oriented behavior components to assess if the findings of this research are similar for all of them. Assessing all of the components the meta categories seems necessary to ultimately determine whether components should be treated separately or continue to be viewed as meta categories. The same goes for components of task-oriented and change-oriented behavior. It might be especially interesting to compare components of change-oriented behavior in an agile context since the agile way of working is ultimately about facilitating change. In addition, the extent to which increasing arousal is effective is yet to be determined. It would be beneficial to uncover the number of SCRs that should be induced to reach an 'optimal state' of flow or performance to indicate how the findings should be implemented in practice. This could for example be done by exposing individuals to a number of stimuli under challenging conditions and studying when this results in stress.

Another suggestion for further research is to assess whether the behavior that caused an SCR was directed at the group or at a single individual to see if personally addressing individuals results in different SCR amplitudes or frequencies. This could be done by distinguishing whether the behavior was meant for the group or a single individual whilst coding. On this note, it might also be interesting to see if teams that portray behaviors that are related to increases in arousal less often operate in a disorganized manner due to fewer stimulations when it comes to paying attention. Furthermore, it is recommended to assess why individuals tend to experience relatively stronger SCRs in the retrospective meeting than they do in other meetings (e.g. by using surveys to gather additional data on the emotions experienced by individuals during all three types of meetings). It is also suggested that future studies could produce interesting findings when looking into the connections between area of expertise and personality traits in relation to electrodermal

activity and into cultural differences. Furthermore, an experiential regression analysis was performed in the early stages of this research. The outcomes suggested that age and experience with agile as a management practice might be able to help determine SCR amplitudes. It is recommended to consider this when performing a similar study in the future to uncover whether these variables should be considered when addressing particular individuals during a meeting. Based on the qualitative analysis, it is suggested that the relationship between Person X and Person Y might also affect the SCRs of an individual (e.g. one might be more or less affected by behavior that is coming from a friend or superior). Finally, it is suggested to further examine the meaning of arousal peaks so it can be determined how to interpret certain results. This could for example be done by using additional biomarkers (e.g. brain activity scanning) or surveys to ask how specific behavior types impact them generally to be draw some generic conclusions.

6. CONCLUSION

The research question that was investigated for this thesis was: "*What is the effect of showing personal interest and providing positive feedback (by person X) on the skin conductance responses of another individual (person Y) during agile team meetings?*" Both a quantitative and qualitative analysis were performed to answer this question. First of all, both behaviors do significantly affect individuals in an audience. Both behaviors were significantly more likely to result in a response than they were to result in a non-response. Although both behaviors tend to result in SCRs, this seemed to occur more frequently when positive feedback was provided, especially when it is aimed to get a response from multiple individuals (as was indicated by the qualitative analysis). Based on this research it cannot be concluded that the two components of relations-oriented behavior have significantly different effects on SCR frequencies and latencies. However, individuals do tend to respond *stronger (higher amplitudes)* to showing personal interest in the retrospective meeting then they do to providing positive feedback, which might indicate that the former induces stronger responses in certain contexts. When both behaviors were taken together (both viewed as relations-oriented) and demographics of the individuals were compared, some significant results were found when it comes to the area of expertise and the nationality of the respondent. Individuals with a Marketing & Customers services area of expertise experience significantly higher mean amplitudes than individuals with other areas of expertise. On the other hand, individuals with an IT and Communications/ Operations area of expertise experience significantly lower mean amplitudes than others. The same was found for individuals with a Dutch nationality. Finally, some specific phrases and pronunciations seem to be effective to induce group responses. Further research is recommended to ultimately determine whether the effects of providing positive feedback and showing personal interest on individuals are similar or differ.

7. ACKNOWLEDGMENTS

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9. APPENDIX

Table 8. Phrases used that induced an SCR for multiple individuals.

Behavior and specifics	Phrase	Number of respondents	Relative % of respondents
Providing positive feedback Emphasizing positive feedback by using words like really, very, extremely, truly, incredibly etc.	"But again, I think you're *really* having a great exchange of information and a *real* nice interaction."	3	42.9%
	"*Very* beautiful."	2	40%
	"We have had an *extremely* good retro." [a]	5	62.5%
	"This has been done *incredibly* well. Hats off."	3	37.5%
Providing positive feedback Using short phrases but pronouncing these with exclamation.	"Top!"	5	71.4%
	"Oh, that's so good!"	3	42.9%
	"Wow, beautiful!"	3	60%
	"Neat!"	2	40%
Providing positive feedback Using words to include the entire group.	"*We* have had an extremely good retro." [a]	5	62.5%
	"*Everyone* is very attentive to everything that is going on." [a]	2	25%
	"Well, if you take a look. *As a team, we* did it nicely."	4	57.1%
Providing positive feedback Using long sentences.	"First, I very much like the way you have your meetings. I also have the feeling that … helps you create better understanding of what you are doing. I think that's really great."	2	28.6%
	"I really notice that myself. [Name] is doing very pragmatic. I like that. If I now bring something up to [name] or [name], I can just step by and we discuss it. I really like that, and it has been very different in the past." [a]	2	25%
	"I would like to share something. Because what it's about in my opinion, and what I think is so good about P3, is that if I take a look at each individual member, I always have the feeling that, within our team, we always keep the customer on top of our minds. And that we take that as a baseline for what we do. And eventually that is represented in the 8.3 on customer satisfaction. And I think that is beautiful." [a]	4	57.1%
Showing personal interest Emphasizing personal interest by using words like really and very.	"Then you should just go there. Really."	2	28.6%
	"Wow, hey, that's good. Really good."	2	28.6%
	"Very good. That is happening very quickly."	2	28.6%
Showing personal interest Long questions.	"And you [name], do you want to get something off your chest?"	3	42.9%
	"But the thing with the police, is that just a prank or…?"	3	42.9%
	"And you [name], how are you doing today?"	2	28.6%

Note. The type of behavior is stated first. The phrases were categorized based on similarities between them (these are explained below the behavior type). Some phrases fit in multiple categories but were added to the most suitable one. [a]

Table 9. Specific phrases used that induced an SCR for one or less individuals.

Behavior	Phrase	Number of respondents	Relative % of respondents
Providing positive feedback	"Good."	1	12.5%
One- or two-word phrases.	"Nice."	1	14.3%
	"Well done."	0	0%
Providing positive feedback	"*Yeah*, you listened to him well."	1	12.5%
Phrases that are pronounced in a way that shows agreement.	"That is *also* a good one."	1	12.5%
	"That is a good point."	1	16.7%
Providing positive feedback	"*I* think it is going well."	0	0%
Emphasizing that it is his/her opinion.	"OK. *I* am glad."	1	11.1%
	"*I* think that is a very good one. Absolutely." [a]	1	20.0%
Showing personal interest	"You, [name]?"	1	14.3%
Short questions.	"You OK?"	1	16.7%
	"Full already?"	1	20.0%

Note. The type of behavior is stated first. The phrases were categorized based on similarities between them (these are explained below the behavior type). Some phrases fit in multiple categories but were added to the most suitable one. [a]