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The socio-emotional basis of human interaction and communication: How we construct our social world

Wolfgang Scholl
Institute for Psychology, Humboldt University, Berlin

Abstract

A review of dimensional research about (the perception of) feelings, non-verbal and verbal communication, behavior and personality reveals in each domain three very similar dimensions. They originated from diverse research areas, often received different names and are conceptually not identical. Yet, the first dimension seems to share in all five areas a general *positive* versus *negative* evaluation (e.g. happiness–disgust or friendliness–hostility), the second a *strong* versus *weak* characterization (e.g. anger–fear or dominance–submission) and the third dimension an *active* versus *passive* impression (e.g. ecstasy–boredom or high–low arousability). These three dimensions are likely to function as fundamental dimensions of interaction and communication as perceived and enacted by humans of all (investigated) cultures. They are interpreted as a universal socio-emotional space that corresponds to an evolutionary need for coordination between individuals. They are implied in the logic of game, exchange or interdependence theory, and manifest themselves in the cultural meanings predicted by affect control theory. The presented overview and reconstruction combines the largely fragmented views of several diverse research domains into a perspective that fosters interdisciplinary understanding and integrative theory-building about human sociality within and between the social sciences with extensions into the natural sciences and humanities.

Keywords

activation, affect control theory, affiliation, feelings (emotions), interaction, interdependence theory, non-verbal communication, personality, power, verbal communication

Corresponding author:
Wolfgang Scholl, Institute for Psychology, Humboldt University, Rudower Chaussee 18, 12489 Berlin, Germany
Email: schollwo@cms.hu-berlin.de

Résumé

Un passage en revue de la recherche dimensionnelle sur les sentiments (et leur perception), la communication verbale et non-verbale, le comportement et la personnalité, met en évidence trois dimensions très similaires pour chacun de ces domaines. Elles proviennent de différents domaines de recherche, ont souvent reçu des dénominations différentes et ne sont pas identiques conceptuellement. Cependant, la première dimension semble partager dans ces cinq domaines une évaluation *positive* versus *négative* (e.g., joie–dégoût ou amitié–hostilité), la deuxième une caractérisation *fort* versus *faible* (e.g. colère–peur ou dominance–soumission) et la troisième une impression *actif* versus *passif* (e.g. extase–ennui ou stimulation haute–basse). Ces trois dimensions fonctionnent vraisemblablement comme des dimensions fondamentales d'interaction et de communication perçues et émises par les humains de toutes les cultures (étudiées). Elles sont interprétées comme un espace socio-émotionnel universel qui correspond à un besoin au cours de l'évolution de coordination entre les individus. Elles sont impliquées dans la logique du jeu, de l'échange et la théorie de l'interdépendance, et se manifestent dans les significations culturelles prédites par la théorie du contrôle des affects. La présente étude combine les visions largement fragmentées de nombreux et divers domaines de recherche en une perspective qui veut promouvoir une compréhension interdisciplinaire et construire une théorie intégrative sur la socialité humaine dans et entre les sciences sociales avec des ramifications vers les sciences naturelles et les humanités.

Mots-clés

activation, affiliation, communication non-verbale, communication verbale, personnalité, pouvoir, sentiments (émotions), théorie de l'interdépendance, théorie du contrôle des affects

Social interaction and communication are key topics for all sciences that deal with the human condition because humans are profoundly social animals. This assertion is evident for all the behavioral sciences like psychology, sociology, economics and political science, but it is also an important research field for some natural science (sub)disciplines like biology, evolutionary anthropology, the neurosciences, and for some humanities like philosophy, linguistics and history. And finally, interaction and communication are especially important for many applied sciences like education, business administration, media studies and clinical psychology. Yet, the exchange of ideas, concepts, methods and results between these diverse sciences is very weak because the predominant paradigms seem to be incommensurable in the sense of Kuhn (1970). Moreover, practical efforts to foster interdisciplinary dialogues and research projects between these sciences are often found to be very unsatisfactory. Even very close subdisciplines, for example psychological and sociological social psychology, often have difficulties in recognizing and integrating insights from each other (Graumann, 2001; Scholl, 2007a).

The primary goal of this article is to argue that humans experience in interaction and communication three universal dimensions, which may be called affiliation, power and

activation. These constructs are well anchored in emotion research, they seem to be an evolutionary acquisition and they reflect the logic of collaboration; at the same time, they are able to map cultural differences precisely. The general picture emerging from this review suggests that humans construct their social world along these three dimensions of socio-emotional perception and action. The aim of this article is to first draw the attention of researchers to the many connections and complements between seemingly disparate research areas in order to gain a better overview and deeper insight into the basics of interaction and communication. The second objective is to demonstrate the intimate connection of these three dimensions to important theoretical approaches in the field of interaction and communication. The third and final aim is to stimulate further innovative research in an integrative and interdisciplinary way such that the exchange across disciplines is facilitated and advances the understanding of human sociality.

The article starts by gathering the fragmented (re)search for basic dimensions of feelings, non-verbal and verbal communication, behavior and personality in which three very similar dimensions have been found. Next, the relations between the three-dimensional structures in each pair of these five research fields are briefly reviewed, showing that they not only have structural similarities but are also strongly connected. Turning then to the most central theoretical perspectives, the necessity and importance of these three dimensions for social life are highlighted. Finally, we suggest how these three dimensions could be used to answer some hotly debated research questions, to derive exciting new ones, and to methodologically improve existing research instruments.

Discussion of the very diverse research results is complicated by different concepts with largely overlapping but not identical content. Moreover, the empirical evidence and the theoretical discussions about these dimensions are dispersed over many years of research in diverse fields and disciplines such that in this article the presentation of each field necessarily has to be short and incomplete. And, last but not least, the author's knowledge of such diverse and vast research areas is incomplete. Accordingly, the reader should appraise this work by focusing and reflecting on the general picture.

1 Basic dimensions of perceiving social phenomena – empirical research results

Research on perceptions in the interpersonal domain has consistently yielded three similar dimensions. The first is variously called valence, friendliness–hostility, communion or *affiliation*, sharing a general *positive* versus *negative evaluation*. The second is called dominance–submissiveness, agency, control, potency or *power*, differentiating *strong* from *weak* agents. The third dimension is alternatively called activity, arousal, affect intensity or *activation*, characterizing someone as relatively *active* or *passive*. These dimensions have emerged from the study of such different phenomena as the perception of feelings, of verbal and non-verbal communication as well as of interpersonal behavior and personality. The results from these different research areas are briefly presented in this section.

1.1 Feelings

The fundamental importance of the emotional dimension *pleasure–displeasure* has been emphasized throughout history in various philosophical traditions. Wundt (1896) was probably the first to add the dimensions *tension–relaxation* (signaling a submissive versus dominant state) and *arousal–repose* to the thinking about human emotional experience. Subsequent research, using a variety of different methods, repeatedly yielded these or similar dimensions when analyzing subjective feelings in different cultures (e.g. Fontaine et al., 2007; Morgan & Heise, 1988; Russell & Mehrabian, 1977; Scherer, 2005; Shaver et al., 1987; Traxel & Heide, 1961). An example is presented in Figure 1, where the first two dimensions, named *valence* (positive–negative) and *control* (high–low), are represented on the horizontal and vertical axes, whereas the third dimension, *intensity*, is indicated by the size of the circles. In interpersonal affairs, affiliation/friendliness is experienced as positive valence, high control is the feeling of power relative to the other, and intensity is the amount of emotional activation.[1] Although feelings and emotions are often used synonymously, it is important to note that these dimensional studies assessed only the subjective experience of emotional processes, whereas emotions also encompass various cognitive, physiological, motivational and muscular subprocesses (Scherer, 1984, 2005).

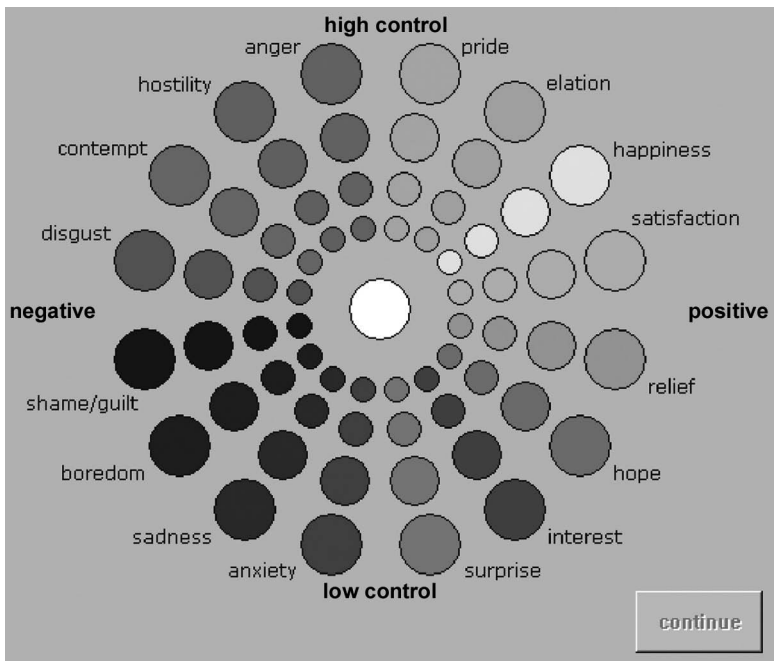

Figure 1. Two-dimensional representation of emotional experience (from Scherer, 2005)

Sometimes, especially in mood research, only two dimensions are used to differentiate feelings: pleasure–displeasure and activity–passivity are included, while the dominance–submission dimension is not even mentioned (Larsen & Diener, 1992; Russell, 1980, 2003; Watson & Tellegen, 1985). Yet, the above-cited studies have shown again and again that similarities and differences of emotional qualities cannot be sufficiently portrayed by a two-dimensional structure. Especially for displeasing, activated emotions, it is important that a third dimension of dominance–submission is introduced in order to distinguish such contrasting feelings as anger signaling potency, and fear signaling a weak position; a problem of the two-dimensional solution that was mentioned already in the review by Larsen and Diener (1992). Shaver et al. (1987) got a corresponding three-dimensional result on the basis of a prototype approach, whereby anger, fear and sorrow as unpleasant feelings differed only in potency. Moreover, anger and fear could be clearly distinguished in a real-life induction on physiological measures (Stemmler, 1989). Finally, in the heretofore most encompassing empirical study of emotions, by Fontaine et al. (2007), the second dimension, potency–control, explained more variance than the third dimension, activation–arousal: 22.8% versus 11.4%.

1.2 Non-verbal communication

Similar dimensions emerge in descriptions of non-verbal communication (Goudbeek & Scherer, 2010; Mehrabian, 1972). Specifically, the interpersonal expression of a good, positive relationship is signaled through *immediacy stimuli* such as touching the other, close interpersonal distance, forward lean, mutual eye-contact as well as head-nodding, smiling and elated vocal expressions, which communicate friendliness and sympathy (i.e. affiliation). A strong versus weak relation is signaled through *relaxation stimuli* (if power relations are settled), which communicate status and social control through an easy and relaxed posture. Relaxation is indexed by asymmetrical arm and leg positions, sideways lean of the torso, relaxed hands and fewer object and body manipulations. Finally, Mehrabian's *activity stimuli* represent the active–passive dimension. Slow, sleepy movements show little activation, while a hasty movement, a quick change of expression and especially faster talking in a loud voice signal high activation and readiness to (re)act.

Some researchers find or propose to use only two of the three dimensions: Some use affiliation and power (dominance–submission) as central dimensions (e.g. Argyle, 1988), whereas others see affiliation (pleasure–displeasure) and activation (degree of arousal) as central, at least as expressed in the face (e.g. Russell, 1980). Yet, since both deliver good empirical arguments for their choice of dimensions, one should combine their dimensions, which amounts to the classic three dimensions.

Facial non-verbal expressions of others are most intensively monitored in everyday life and they also figure very prominently in research. Importantly, Ekman et al. (1987) have shown, in an overview of relevant studies, that observants from very different cultures can correctly identify prototypical feelings from facial expression such as happiness, anger, sorrow, fear and surprise. Moreover, members of different cultures also produce the same facial expressions when asked to show a certain feeling. The same emotions in facial expression were found even in children born blind who could not have learned them by imitation (Keltner & Ekman, 2000). With regard to non-verbal vocal

expressions, the results point to the same conclusion: Emotions expressed in speech can be successfully detected to a large extent by receivers, even from differing cultures (Scherer, Johnstone & Klasmeyer, 2003). It can be concluded that some non-verbal signals are likely to be not only universal but also biologically fixed; this is an important point to bear in mind for my subsequent interpretation.

1.3 Verbal communication

According to Osgood, Suci and Tannenbaum (1957), the connotative, emotional meaning of any chosen verbal term can be described by three dimensions, named evaluation, potency and activity, which can be measured by the 'semantic differential'. *Evaluation* is represented by adjective pairs such as good–bad, positive–negative, agreeable–disagreeable or friendly–unfriendly. Evaluation describes the fundamental experience of something or someone as positive versus negative. In an interpersonal context, a positive evaluation indicates that the other is seen as friendly, nice and likeable. *Potency* is characterized by pairs of adjectives such as strong–weak, superior–inferior or experienced–inexperienced, and describes who has more and who has less control when applied to relationships. Finally, *activity* is characterized by pairs of adjectives such as active–passive, loud–quiet and fast–slow to describe the activation and intensity of actions, experiences and persons.

The same three dimensions of connotative meaning have been found in all investigated languages (Osgood, May & Miron, 1975). They can also be reliably measured through polar adjectives (as by Osgood and his followers) or through polar nouns (Ertel, 1965). Thus, the notion of a universal three-dimensional system of meaning in human languages is well supported. Importantly, according to Ertel (1964) and Osgood (1969), this *con*notative meaning of language reflects the emotional experience with the *de*noted aspects.

1.4 Behavior and personality

Foa (1961) was the first to note convergences in the research on behavior and personality dimensions. Different methodological approaches consistently yielded the two basic dimensions of *love–hostility* and *dominance–submission*, sometimes also called *affiliation* and *power* or *solidarity* and *individual prominence* (see Foa, 1961). Cross-cultural studies confirmed these two dimensions (Lonner, 1980), which may describe behavior as well as personality. Leary and colleagues (Freedman et al., 1951; Leary, 1957) portrayed this two-dimensional space as a circular continuum with 16 sectors of interpersonal variables (cf. Figure 2), mathematically specified as a 'circumplex'. The notion of the circumplex has become firmly established in today's literature (e.g. Kiesler, 1983; Wiggins, Trapnell & Phillips, 1988), now often using the dimension names *communion* and *agency* (Abele et al., 2008; Wiggins, 1991). McCrae and Costa (1989) could show that extraversion is represented in the upper right quadrant (Wiggins, Trapnell & Phillips, 1988; extraverted and ambitious), whereas agreeableness falls within the lower right quadrant (ingenuous, warm). This two-factor plane of personality dimensions could be established in several cultures (McCrae & Costa, 1997).

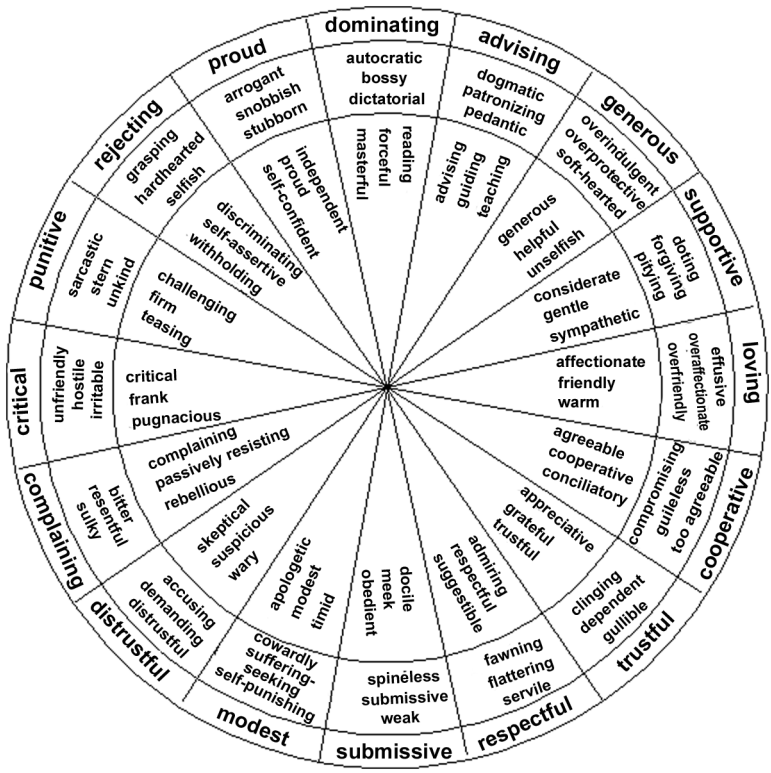

Figure 2. The circumplex system of 16 interpersonal mechanisms (from Freedman et al., 1951)

The interpersonal circumplex classifies behavior as well as personality perceptions only on two dimensions. Yet, a third dimension has also been found in behavior descriptions but has not been included in most circumplex research. For example, Wish, Deutsch and Kaplan (1976) analyzed a broad range of relationship behavior with multidimensional scaling. They found a third dimension of *intensity* (measured also as involved, emotional versus neutral, distinguishing parent–child relationships from those with distant relatives or acquaintances). This dimension was obtained third after the first dimension, *cooperation* (measured as friendliness versus competition, distinguishing close friends or married couples from political enemies and economic competitors), and the second, called *dominance* (measured as autocratic versus submissive, distinguishing master or parents from close friends or business partners as equals, and both from servants or children).[2] Another three-dimensional behavior system was established in group research by Bales, Cohen and Williamson (1979) in which they called their dimensions *friendly–unfriendly, dominant–submissive* and *emotionally expressive–instrumentally controlled*.

Personality literature also describes such a third dimension of more or less intense emotionality. For example, Mehrabian's (1996) three temperament dimensions include

trait Arousability as well as *trait Pleasure* and *trait Dominance*. While the two latter dimensions coincide with the respective circumplex dimensions (Wiggins, Trapnell & Phillips, 1988), trait arousability is a third, independent factor. The personality dimension *affect intensity*, conceptualized and measured by Larsen, Diener and Emmons (1986), could also be viewed as such a third personality dimension. Larsen and colleagues found that people differ reliably in affect intensity across all feeling qualities. A new study with a German version of the affect intensity scales found that this trait had only small correlations with the two circumplex dimensions (Kölle, 2010).

1.5 First conclusion: The similarity of the three dimensions in five research areas

Separate analyses of the perception of interpersonal behavior and personality, verbal and non-verbal communication, as well as feelings, yielded reliably three very similar underlying dimensions. The perceptual character of these dimensions is important to keep in mind because they are a way to construct and process the meaning of social phenomena. The cited authors use a host of different terms for these similar dimensions, even within the same research field and discipline. Of course, subtle differences exist in the meaning and operationalization of similar concepts; hence, these overlaps and differences are worthwhile investigating more closely. For the argumentation here, a brief discussion should suffice to point to the basic similarities. To simplify and standardize the dimension names for the following argumentation, I have generally referred to these three dimensions by using the following nouns and adjectives: *Affiliation* (differentiating *friendliness* as *positive* from *hostility* as *negative*); *Power* (*dominance–submissiveness* or *strong–weak*), and *Activation (high–low arousability* or *active–passive*).

2 Relations between feelings, communication modes, behavior and personality

The reliable emergence of very similar dimensional structures from the perception of feelings, communication modes, behavior and personality raises the question of whether these underlying dimensions reflect structural connections between these domains or whether they are just surface analogues. In the following sections, evidence for direct connections between each pair of domains is discussed. Some research has provided strong evidence for a direct link, whereas in other studies the evidence is weaker or the relationship is unclear and calls for more research.

2.1 Feelings and non-verbal communication

The connection between feelings and non-verbal communication appears at first to be obvious. Research by Ekman and colleagues (1987) as well as by Izard (e.g. Izard, 1971) established that certain basic emotion facial expressions are universally recognized. However, when certain expressions are *recognized* as signaling certain emotions, this

observation does not necessarily mean that they are in fact the expressions of an underlying state. This notion was emphasized by Fridlund (1994), who concluded that for emotion expressions to be truly useful as a communicative signal they should be linked to the organism's social motives rather than to quasi-reflexive emotions. In the following debate, Scherer, Johnstone and Klasmeyer (2003) drew attention to a basic communication insight by Bühler (1934) that all human signals can be – in varying proportions – symptoms of the sender's state (here emotional ones), representations of a world aspect (objects of communication are emotionally evaluated) and appeals to a receiver. Hess, Banse and Kappas (1995) showed this explicitly for facial expressions. Their meaning cannot be inferred solely from the expression itself; context aspects have also to be considered. In the context of mutual gazing toward each other, the expression is most likely tied to inner feelings (i.e. feeling state), representation and an appeal to go together. But if the sender looks away and the receiver looks at the sender, then the facial expression of the sender is usually an illustration of the narrative or the attitude of the sender but not necessarily an expression of his or her momentary feelings (Krause & Merten, 1999; Merten, 1997). For example, in a discussion about a political event, the sender might facially express anger and at the same time feels happy to be able to play out his feelings about the political event to a friend.

Taken together, these findings support the view that feelings and facial expressions are causally related but that this relationship is not one-to-one. Frijda and Tcherkassof (1997: 80) speak of a distinct affinity, 'which exists cross-culturally and probably universally', and they conclude that 'although the link is neither exclusive nor necessary, it is an intrinsic one' (Frijda & Tcherkassof, 1997: 99).

2.2 Feelings and verbal communication

A relationship between feelings and verbal communication was shown in studies that examined the dimensionality of feelings as both similarity ratings and verbal semantic differential ratings. Each rating yielded a three-dimensional structure with similar locations for feelings and words (Traxel & Heide, 1961). The relationship of feelings and semantics could also be established in the emotion–word studies mentioned above, which found that the same three dimensions as with the semantic differential are necessary to distinguish emotions adequately but that these are not evenly spread over the semantic space (Morgan & Heise, 1988; Shaver et al., 1987). One can reasonably conclude that this result is not simply due to the affective three-dimensionality of language. The relationship between feelings and semantics is probably one of learned associations. Equipped with the parallelism between verbal communication and feelings, humans are able to feel with an unknown third person when a certain event is verbally reported to them, which is the basis of all kinds of story-telling. Although this language-based empathic capacity is an everyday experience, the author found only indirect evidence in the above-mentioned study by Krause and Merten (1999): Successful psychotherapists are able to infer the appropriate feelings from the stories of patients even if the patients are not themselves able, because of their disorder, to express those feelings verbally or non-verbally.

2.3 Feelings and interpersonal behavior

Many emotion researchers see physiological states, feelings, emotional expressions, cognitive appraisals and action impulses as basic components of the complex compound called emotion (e.g. Scherer, 2005). Feelings, which monitor the internal emotional state and the external situation, are a holistic account that helps one to decide for oneself about action (Ellsworth & Scherer, 2003). Positively evaluated situations and liked individuals are to be approached, negative and disliked stimuli are generally avoided. Anger induces aggressive behavior, fear induces withdrawal and flight behavior, and the stronger the activation of the resulting feeling the more vehement and immediate the action impulse. The reverse also seems to be true that behavior influences feelings, at least for the evaluation dimension. That is, approach behavior automatically facilitates positive feelings and cognitions, and avoidance automatically facilitates negative feelings (Neumann, Förster & Strack, 2003).

2.4 Feelings and personality

A connection between feelings and personality was shown by Fisher et al. (1985). They used 17 adjectives taken from a personality circumplex to create self-descriptions of mood. Subjects described their momentary mood with these adjectives and a two-dimensional circle resulted, similar to the personality circumplex. Their findings demonstrated that feelings and personality impressions can be mapped onto the same semantic space, which is more than just the judgment of similarity as discussed in the preceding section. Perhaps the causal path is bi-directional. Certain frequent feelings could result in respective personality shifts. For example, frequent joy might strengthen extraversion, and frequent sadness introversion. These traits, in turn, might foster the respective emotional experiences.

2.5 Non-verbal and verbal communication

The match between non-verbal and verbal communication was established by Osgood (1966) and Mehrabian (1972); they consolidated the three dimensions of non-verbal communication with those of verbal communication using the semantic differential. Schacht and Sommer (2009) found that happy faces and positive words elicited the same event-related brain potentials (ERPs). The only difference was that the meaning of facial expressions was decoded faster than that of words, perhaps a hint to the evolutionarily older non-verbal system. Bradley and Lang (1994) developed a measurement technique for feelings with stylized drawings of manikins varying on the three dimensions in their non-verbal expression and confirmed their meaning by the appropriate correlations with the three verbal dimensions of the semantic differential. The match between non-verbal and verbal communication is very important in daily interaction because a substitution between verbal and non-verbal meaning is only possible if there are comparable dimensions. Such comparisons are, for example, necessary to evaluate the truthfulness of a speaker, since an untruthful message may be uncovered by a differing non-verbal message that can be less well controlled (Ekman & Friesen, 1969;

Mehrabian, 1972: Ch. 6). And many linguistic phenomena, such as irony and sarcasm, among others, are made understandable by a suitable non-verbal support signal; Gibbs (2000) found in two-thirds of ironic instances in everyday speech between friends a special voice tone underscoring the ironic intent. Interestingly, in electronic mail, where nonverbal signals are not possible, emoticons like ;-) or ^ ^ have instead been introduced which paraphrase non-verbal signals. Furthermore, non-verbal communication is phylogenetically much older than communication by language, which is specific to the human race. Human language expands the communication potential enormously to *de*note a multitude of actions and objects but it stays within the same three-dimensional space of emotional or *con*notative meaning as non-verbal communication. Finally, this parallelism facilitates the acquisition of another language with all its nuances of meaning, since the correct meaning can be verified by comparing it to the accompanying non-verbal expressions (Scheff, 1973). The universal three-dimensionality of non-verbal communication is likely to have phylogenetically caused the respective universal three-dimensionality of connotative meaning in all researched languages, whereas the denotative meanings vary in the extreme.

2.6 Non-verbal and interpersonal behavior

The connection between non-verbal communication and interpersonal behavior has not been extensively studied, probably because the relationship seems too obvious. First, non-verbal behavior is already behavior; it expresses and communicates a relationship message to others (Watzlawick, Beavin & Jackson, 1967). Second, non-verbal behavior such as threatening facial expressions and movements often are part of action sequences; thus, no clear boundary can be found between static non-verbal expressions, dynamic non-verbal behavior and specific actions. A review of repeated dilemma games (Sally, 1995) revealed a strong positive effect of visual sight on cooperation rates even after controlling for all other determinants. The obvious explanation is that people are able to detect the action tendencies of the other person from non-verbal expressions, and can then use more effectively a tit-for-tat strategy.

2.7 Non-verbal communication and personality

The connection between non-verbal communication and personality was investigated in an especially convincing study by Gifford (1991). His participants first completed a questionnaire that measured the personality circumplex (friendliness and dominance) with 128 adjectives. One week later, they participated for 15 minutes in a dyadic interaction that was videotaped and coded for non-verbal behavior. Head orientation towards the interaction partner occurred more frequently the more the participants described themselves as extraverted (friendly dominance). Frequency of head nods correlated highest with an agreeable personality (friendly submission) and object manipulations were found most often for submissive persons. Spreading the legs was more typical for dominant persons, whereas introverted individuals (hostile submission) moved their legs more frequently. Thus, Gifford (1991) showed that personality affects the frequency of non-verbal behavior along the two circumplex dimensions. Further confirmation comes

from recent studies by Todorov (2010) and colleagues. On the reception side, facial expressions of emotion are perceived as markers of personality (Hess, Blairy & Kleck, 2000; Montepare & Dobish, 2003; Todorov, 2010). Hence, non-verbal expressions are used not only as information about the feeling state of others but also partly as personality trait information about affiliation and power. There appears to be no such research with the activation dimension.

2.8 Verbal behavior and interpersonal behavior

Interpersonal behavior is to a large extent also verbal behavior. The SYMLOG (System for the Multiple Level Observation of Groups) studies by Bales, Cohen and Williamson (1979) depict interactive and group behavior as well as communicative content (images) in the same dimensions of affiliation (positive–negative), power (upward–downward) and arousability (backward–forward). That is, there must be a reliable relationship between verbal communication and related behavior. On the other hand, communication is often used to hide one's behavioral intentions or to deceive others, which is only detectable from non-verbal cues (cf. above). Thus, verbal communication is especially useful for predicting upcoming behavior in face-to-face interactions where non-verbal cues can be checked (e.g. Kerr & Kaufman-Gilliland, 1994).

2.9 Verbal communication and personality

To my knowledge no study has thoroughly assessed the relations between verbal communication and personality. As a very direct and unquestioned connection, personality is usually measured by questionnaire items that contain words with exactly those connotative meanings as measured in the semantic differential (e.g. Jacobs & Scholl, 2005). A more explicit study on ambiguous (TAT-like) pictures would be useful where the impressions are rated by participants on the semantic differential and these ratings could then be regressed on their personality dimensions measured at another time. A good starting-point would be studies like that of Raynolds, Sakamoto and Saxe (1981) if one looks into personality-related differential impressions.

2.10 Interpersonal behavior and personality

A strong connection between interpersonal behavior and interpersonal personality traits is assumed by Buss and Craik's (1980) frequency concept. Using the dominance dimension, they demonstrate a close connection between prototypical dominant behavior and the personality trait dominance. People judge the personality of others by registering how often and how intensely certain behaviors occur and infer from that observation their personality. Implicitly, this connection lies at the heart of many measures of personality that assess the frequency of certain behaviors and derive personality dimensions from bundles of correlated behaviors. Causality is probably bi-directional. Personality traits, which are to some extent inherited, influence respective actions, and the frequency of specific behaviors, instigated by social roles and other social pressures, molds personality.

2.11 Second conclusion: Connections between the five research fields along these three dimensions

Empirical connections have been found between almost all ten pairs of the five interpersonal domains of feelings, non-verbal and verbal communication, behavior and personality. The connections suggest that these domains are closely and perhaps causally related through their three-dimensional structure. Of course, more research is needed because some relationships are not well confirmed, and often the nature of causality remains unclear. Yet, the three-dimensional parallels between these five areas of human experience and behavior are neither superficial nor linguistic artifacts and hence ask for a deeper interpretation and explanation.

3 The socio-emotional basis of interaction and communication – theoretical perspectives

As outlined above, the three dimensions of feelings, non-verbal and verbal communication, interpersonal behavior and personality parallel each other in their content. They are empirically connected and directly or indirectly causally related. Collectively, these relationships raise the question of how these parallel structures can be theoretically explained and what they imply for our understanding of human interaction and communication.

3.1 Emotion research

A good starting-point is emotion research because all five areas have an emotional component. Especially applicable is the theorizing of Scherer (e.g. 1984, 2005) and his collaborators (Fontaine et al., 2007). The emotion system has the function of 'mediating between constantly changing situations and events and the individual's behavioral responses' (Scherer, 1984: 295). Therefore, any external or internal stimulus must be evaluated for its personal well-being and survival relevance. Scherer proposes a sequence of five stimulus evaluation checks (SECs): The first SEC evaluates stimuli for their *novelty* or unexpectedness, checking whether it seems to be necessary to change the present behavior that starts activation.[3] The second SEC evaluates the intrinsic *pleasantness or unpleasantness* of the novel stimulus, which is directly captured by the positive–negative dimension that can be spelled out in encounters as friendliness–hostility. The third SEC evaluates the *goal/need conduciveness*, that is, whether the novel stimulus will advance or hinder goal attainment and need satisfaction. This check relates the stimulus's consequences to the positive–negative dimension, assessing whether it will be good or bad for oneself. The fourth SEC determines the *coping potential*, including the four subchecks of causation, control, power and adjustment, all of which are related to the strong–weak dimension. The fifth SEC is a *norm/self-compatibility* check in which one's own and others' behaviors are checked against internal or external standards. This check is related to the positive–negative dimension, not in a utilitarian but in a moral way (cf. the double meaning of good versus bad). Together, the five stimulus evaluation checks can be mapped onto the three socio-emotional dimensions, which supports the review in the first part of this article. These SECs can be processed quickly.

For example, if another person jumps out of the dark drawing a knife, this event is extremely novel, unpleasant, need threatening and overwhelming for the person concerned (the first four SECs). As a result, the receiver is likely to feel frightened, that is, finding him- or herself in a negative, weak and activated state, as mapped onto the three dimensions.

Emotion theory is also revealing with regard to the relatedness of the five research areas of feelings, non-verbal and verbal communication, behavior and personality. In explicating the emotion system, Scherer (2005) lists several components of emotions with distinct functions and direct references to the five areas.[4] (1) Subjective *feelings* have the function of monitoring internal states and organism–environment interactions. (2) The *non-verbal expressions* have the function of communicating reactions and behavioral intentions, which can be decoded by the receiver. (3) The motivational component has the function to prepare and direct one's *behavior*. (4) The cognitive appraisal component *evaluates affectively* any relevant objects and events. These cognitions are partly subconscious and automatic, often the first cognitive steps in the whole process, but they can also be consciously reflected and communicated (Leventhal & Scherer, 1987). Cognitive appraisal processes refer to the realm of *verbal communication*, including speaking with oneself in thought processes. (5) The neurophysiological component, which has the function of system regulation, was not explicitly included in our review above because it seems to be less conclusively researched. Yet, more and more investigations find neural parallels to the evaluation dimension (Todorov, 2010) or to all three dimensions (Skrandies, 1998). Only the *personality* area is not included in the emotion components in Scherer's system, but it could be seen as an extension of the behavior component with the above-mentioned frequency approach (Buss & Craik, 1980) and of the neurophysiological component if the inherited parts of personality (usually called temperament; cf. Mehrabian, 1996) are considered. The connection between these five components is emphasized by Scherer (1984: 311): 'In line with many recent findings in ethology and biology, as well as in developmental psychology, I am inclined to believe that there is some degree of "prewiring", innately determined links between changes in one subsystem and correspondent changes in other subsystems.' A new study from Fontaine et al. (2007) confirmed these subsystem relations through a factor analysis of ratings of 24 emotion terms on these emotion features operationalized through 144 items (using the verbal domain without further discussion). Thus, it can be concluded that an intimate relatedness between these five areas exists through the emotion system of humans. Yet, some questions concerning the causal relations between these five areas as discussed in the second section cannot be answered by a factor analysis and are therefore still open.

3.2 An evolutionary perspective on emotions and human coordination

Biological theory (e.g. Bischof, 1989; Trivers, 1971), group dynamics (e.g. Forsyth, 1998) and evolutionary psychology (e.g. Cosmides & Tooby, 2000) converge toward the conclusion that the evolution of sociality among animals was triggered by the advantages of inclusive fitness because combined actions and an appropriate division of labor among non-kin individuals enable groups to manage larger and more complicated problems than

individuals or families can afford. In an instructive article about the phylogenetic origin and function of emotions, Bischof (1989) stated that the rigid instincts, innate and fixed stimulus–response contingencies, were successively replaced with more flexible emotions during the phylogenesis of mammals. Emotions respond more flexibly than instincts to environmental conditions as well as to potentially conflicting needs of the organism (see also Ellsworth & Scherer, 2003). This flexibility enables a more extensive search for suitable solutions to daily problems for which animals with a more complex nervous system have a highly developed capacity, especially humans with their ability for verbal communication.

Emotions also help to coordinate the actions of individuals in a group. Socially living mammals developed the capacity to express their emotions non-verbally such that they can be perceived by their companions and their adversaries. While bodily signs of approach or avoidance, of dominance or submission, and activation or passivity are often also displayed by non-social animals, they react more instinctively and are less able to modulate and express their emotional reactions and intentions vis-a-vis diverse social partners and situations. Advanced during hominization, non-verbal expressions of emotions evoke similar and complementary feelings in others. Thus, the ability to see how others feel and to draw inferences regarding their likely intentions allows individuals to better coordinate their actions (Hatfield, Cacioppo & Rapson, 1994; Keltner & Kring, 1998). This improvement of reciprocal coordination through the expression of emotions offers a viable phylogenetic explanation for the observed feeling–expression–reception–understanding connection between inner feelings and outer emotional signals in facial and vocal expression of a sender, and the perception and reconstruction of the likely meaning by a receiver.[5] By that fact, a reciprocal recognition and sufficient understanding is secured that facilitates social actions. Yet, collective actions as well as a useful division of labor have to be properly coordinated, an almost unsolvable task if individuals primarily follow their self-oriented survival imperatives even if they recognize the intentions of the other. Bischof (1989) described synchronization and dominance as two general strategies that overcome this danger of selfish digression in favor of coordinated action.

Synchronization or voluntary cooperation is the mutual coordination of actions on the basis of reciprocal friendliness and affiliation, which are usually communicated nonverbally. If an individual approaches another with a smile, bending forward for news exchange and tuning in to his or her situational feelings, then this individual is most likely to be a trustworthy partner (Todorov, 2010) for deliberate cooperation. If the feelings of another individual are unfriendly, angry, contemptuous, or miserable, and if they are not perfectly masked, then the focal person will hesitate to cooperate or will only fulfill the common task with minimal effort. Action coordination through synchronization covers the friendliness part of the circumplex of interpersonal behavior, assuming about equal power (see Figure 2). Mutual synchronization remains an option even when the potential participants are not equally equipped with capabilities or possessions in a specific situation, that is, some might have fewer or no resources at hand, while others have more. In such a case, the better equipped, more powerful person can offer support, resources, advice, encouragement or own initiative (upper-right sectors of the circumplex), while the weaker one is willing to compromise, trust, be grateful, to follow or

just to imitate (lower-right sectors). In other situations, the resources might be distributed in reverse, and a reciprocal action can unfold. With this principle of reciprocity (Trivers, 1971) based on long-term mutual dependence, synchronization for actions is possible and beneficial for all involved.

However, the more unequal the partners and their resources, the more likely is the second coordination pattern, which Bischof (1989) calls *dominance* (upper half of Figure 2). Coordination through dominance basically means that the stronger, better equipped, more experienced and thus dominating person (or group) gets its way, makes decisions, leads a group and induces or pushes others to follow. Among humans, as with other primate groups, a clear hierarchy evolves in which the higher-ranking individuals determine the direction while the lower-ranking individuals follow and complement the actions of the leading individuals (e.g. Savin-Williams, Small & Zeldin, 1981). The outcome may be favorable for all members of the group for several reasons. First, coordinated action enables better accomplishments, the 'cake' to be distributed becomes bigger or an acute danger can be more safely mastered. Second, even though the more-powerful individuals usually get or take more of the share and thus satisfy more fully their own interests, for the less powerful the outcome is often still more favorable than what they could have achieved alone. Thus, dominance and submission can afford a second basis for coordinated action with higher survival value, supplementing synchronization.

The fine-tuning of the actual coordination is supported by the third dimension of activation. In synchronization, one may signal to the other whether the joint action should be executed slowly or speeded up, and in dominance–submission the stronger person or group can signal via an activated expression to the weaker that it is time to follow, or that it is urgent to conform (or flee), or how immediate and heavy the punishment might be in case of disobedience. Thus, these three dimensions function as coordination devices because they can be non-verbally expressed and modulated, a capacity that evolved during phylogenesis and is already present in other mammals, especially in primates.

3.3 The logic of interdependence

The adaptive survival function of the three socio-emotional dimensions is consistent with the evolutionary point of view. The arguments are very plausible but not logically derived. Yet, it can be shown that these three dimensions reflect the inherent logic of any exchange between self-interested individuals. A framework for this discussion can be found by looking into mathematical game theory (Von Neumann & Morgenstern, 1944) with its extensions into behavioral game theory (e.g. Gintis, 2009), sociological exchange theory (e.g. Cook, 1987) and psychological interdependence theory (e.g. Kelley et al., 2003). Kelley (1979: 34–36) elaborated the logic of interdependence, usually represented in game matrices, with reference to the above-cited study of relationship dimensions by Wish, Deutsch & Kaplan (1976): Synchronization and cooperation are evoked by the degree of *correspondence between the outcomes* of the interactants: The more correspondent they are, the more spontaneous friendliness and subsequent cooperation are induced because both partners profit from the coupling of their actions. Conversely, the less correspondent they are, the more competition will ensue or the relationship will be dissolved. Dominance and submission are elicited by *differences in dependence*. If

people are less affected by the decisions of others or have a better outside alternative than vice-versa, then they are more powerful (see the empirical research by Molm, 1997). The third dimension, activation, is inherent in any game matrix as *magnitude of dependence*, arising from the differences between alternative outcomes for each interactant. The larger the benefit differences between the given alternatives, the more important is a better outcome for one's well-being and the more arousal and activation can be expected. Regardless of the ambiguity in the empirical dimensional studies reported in the first and second sections, especially when compared among the different research areas, the three dimensions can be logically derived from the basic interdependence structure of the benefits or utilities of the actors. Thus, the human perception of behavior as well as its indication through feelings, non-verbal and verbal communication, and personality impressions could arguably have been structured by evolution along these three dimensions of interdependence. Exemplary matrices for the interdependence logic along these three dimensions are shown in Figure 3.

The upper-left matrix of Figure 3 shows a typical dyadic dilemma: The best result for both together is to be eager at the task at hand (4 + 4 = 8); but each individual person may try to defect, which here means to be lazy at the task while pretending to be eager and assuming that the other will be eager, because a benefit of 5 is better than one of 4. Because both may think the same way or they may fear that the other will cheat, both may end up with 3 for themselves and only 6 for both together. If both know each other or come to trust each other, e.g. through nonverbal signs, then they are able to come up again and again with positive results (4 for each and 8 for both together). The upper-right matrix is more correspondent and, in this case, involves no dilemma. The personal valuations of A and B induce cooperative behavior because then they reach personally a

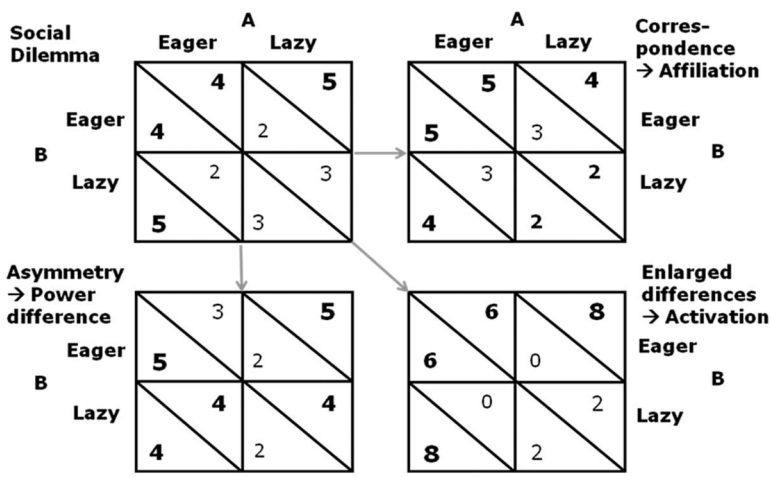

Figure 3. The relational logic of interdependent actors (exemplified with a typical collaboration dilemma in which to be eager means to cooperate, whereas to be lazy means to defect)

benefit of 5 and together one of 10, and that is the best alternative. So, it is better to affiliate with a person with valuations that deliver correspondent outcomes than to bear the risk of a dilemma with another person. And if outcomes are mostly correspondent it is easier to trust the other in an occasional dilemma situation, too. The lower-left matrix shows that A could help B a lot by choosing to be eager (leaving benefits of 4 or 5 for B) and to harm him by choosing to be lazy (leaving benefits of only 2 for B). On the other side, B cannot severely affect A through his choice because A still can get a benefit of at least 4 or even one of 5. Thus, such an asymmetric matrix will give one actor more power than the other. Finally, the lower-right matrix is a similar dilemma as the upper-left matrix but it exhibits larger differences between possible outcomes, e.g. in the worst case 8 versus 0 instead of 5 versus 2. These enlarged differences are likely to activate the involved persons, signaled on the third dimension, either by trying to find out as much as possible about the other's intentions or, if that is not feasible, to await nervously the upcoming result.

The importance of these kinds of interdependencies and the difficulties of social coordination are highlighted by the abundant research on dyadic and social dilemmas in all behavioral sciences (e.g. Dawes, 1988; Gintis, 2009; Sally, 1995). Dilemmas and other mixed-motive games are typical structures for many interpersonal and social problems. In the already cited meta-analysis of Sally (1995), non-verbal as well as verbal communications have been shown to be very helpful for cooperative solutions that raise the benefit or inclusive fitness of all involved. The sophisticated nature of the above explicated feeling–expression–reception–understanding connection and how it can foster cooperative solutions has been nicely demonstrated in a series of experimental games by Wubben (2009). In direct reciprocity (tit-for-tat), *disappointment after defection* of the other signals that a positive expectation still exists, which in turn is answered by the other with more cooperation; *anger after defection* signals a negative expectation and a likely future defection, and is in turn often answered with defection, leading to a negative escalation. In indirect reciprocity, that is, when an observing third person reacts toward one of the interactants, *defection accompanied by disappointment* of one person toward the other is inferred as justified and answered by cooperation by the third person vis-a-vis the defector. On the other hand, *defection accompanied by anger* of a person toward the other is interpreted as unjustified by the observer and answered by defection toward the defecting person. Wubben (2009: 103) concluded, 'the main finding of this dissertation, then, is that by and large, emotions function as ubiquitous and indispensable, socially informative cues that help establish cooperation'.

3.4 The importance of culture

Humans differ from other animals especially through their language capacity, the passing of acquired knowledge to the next generations and the evolution of culture. The question arises whether cultural variability can be adequately portrayed with the three socio-emotional dimensions beyond the inherited aspects. Evidence from experimental game research has consistently shown that differences in cultures or in framings of the same formal interest constellation (as formalized in the pay-off matrix) produce systematically different results (Gintis, 2009; Henrich et al., 2001, Liberman, Samuels & Ross, 2004).

These within-culture similarities and between-culture differences can be explained and predicted with affect control theory (ACT: Heise, 1979, 2007, 2010): Language, the means of verbal communication, not only consists of words with a culturally shared emotional meaning, it also transports a whole worldview with action recommendations to which the individuals of a culture are motivated to adhere.

ACT is a consistency theory based on the affective meaning of words within a specific culture as measured by the semantic differential of Osgood, May and Miron (1975). The operational basis of this theory is a culture-specific *con*notative lexicon containing the most common words of a community positioned in the three-dimensional semantic space. The theoretical basis is laid down in a system of mathematical equations that regress a balanced sample of event sentences on their single words for actor(s), action, other actor(s) as object(s), personality traits or feelings and maybe settings. Culture-specific equations are derived from about 100 differing event descriptions and can then be applied to predict the holistic emotional impression of any other event description (transient impression) from its single words (fundamental sentiments). Likewise, any other unknown aspect can be predicted if the holistic impression is given: Likely actions can be predicted from knowing the identities of actor and target, likely emotions can be predicted for actor or target after an action, etc. Event impressions described with words that do not fit emotionally cause a 'deflection', that is, an uneasiness or affective inconsistency. ACT can mathematically identify the extent of affective deflections (measured as Euclidean distance in the three-dimensional semantic space) and it can predict quite precisely by mathematical simulation which actions or re-definitions of the situation are most probable in order to decrease the emotional uneasiness. An example is given in Figure 4.

ACT is one of the most encompassing and precise social-psychological theories, translating the more qualitative, phenomenological approaches of symbolic interactionism into an exact quantitative system with point predictions that deliver astonishing plausible results (Heise, 2007). In a recent study, ACT was experimentally tested and well corroborated (Schröder & Scholl, 2009). In another study (Schröder et al., 2013), ACT was extended to non-verbal consistency, that is, non-verbal behavior was observed and rated on the three socio-emotional dimensions with a newly developed observation system (Schermuly & Scholl, 2012). These non-verbal ratings were inserted into the ACT equations in place of the semantic word values. As expected from the deflection principle, the more inconsistent (as computed with ACT) a non-verbal reaction was with the preceding non-verbal action of the other, the less frequently it could be observed in the interaction. This result confirms in an especially convincing way that a very close relationship exists between the culturally shared verbal and non-verbal meaning space along the three socio-emotional dimensions and that these guide human communication and (inter)action.

The special insight to be gained from affect control theory is that consistency is not confined to individual emotion and cognition as in other psychological consistency theories (e.g. Heider, 1958) because it binds together all well-socialized people within a given culture through their common language and thus establishes and preserves a collective meaning space. Affect control theory adds substance to the self/norm compatibility check of the above-cited emotion theory of Scherer (1984), that is, the norm check

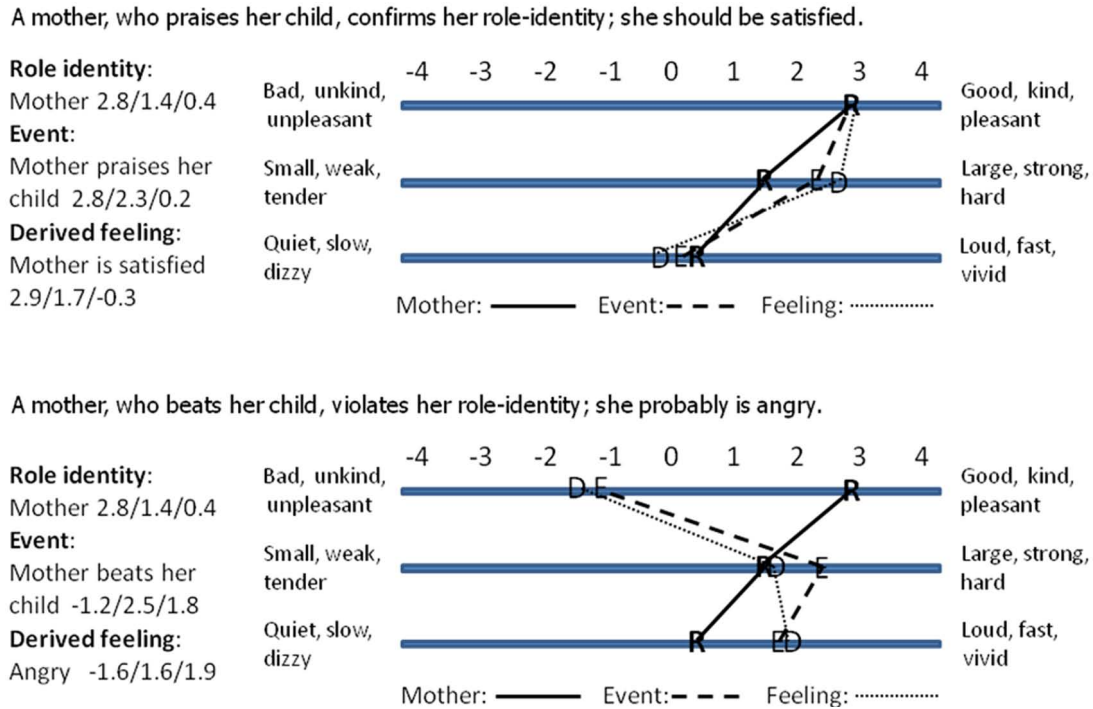

Figure 4. Example of a consistent event (deflection = 1) and an inconsistent one (d = 20) and the ACT derivations of fitting feelings (adapted from a presentation of T Schröder).

Note: The numbers in the LH columns are the Evaluation/Potency/Activation estimates.

could be operationalized through the deflection measure for (in)appropriate behavior. The motivation to avoid larger deflections is a truly *socio-emotional* consistency because people thereby gain security in their *worldview*, harvest the experience of their *culture* and preserve their general cooperation opportunities through a *common* understanding of the *emotional* meaning of relevant *social* aspects.

Viewed from an evolutionary perspective, this structure of a three-dimensional socio-emotional world is likely to have great value for individual learning and orientation as well as for social coordination. Evolutionary forces have secured a sufficient amount of mutual understanding by extending the non-verbal feeling–expression–reception–understanding connection into the verbal realm of socio-emotional meanings shared through language. Whereas the logic of interdependence forms the *social* basis of these three dimensions, the shared affective meaning of language reflects the coupling with the *emotional* aspects as a kind of socio-cultural guide. Henceforth, acquired knowledge can be transmitted from generation to generation in its relevance for 'the social construction of reality' (Berger & Luckmann, 1966), for social coordination and for better survival chances. Diverging experiences and new knowledge of individuals and groups can add new insights to that cultural stock of knowledge and can also modify its meaning through an interplay of collective reasoning and action.

3.5 Third conclusion: The three dimensions secure social understanding and coordination

The research and discussion presented thus far lead to the following conclusions: Social animals have evolved phylogenetically because coordinated social actions have important advantages over solely individual actions (Keltner & Haidt, 2001). To coordinate these social actions, appropriate devices must have co-evolved along the benefit constellations (as abstracted in game matrices) of interdependent actors and their preferences. Non-verbal communication can announce correspondent outcomes through friendly expressions, differences in dependence through signs of power, and the intensity and urgency of both through activation signals. For socially dependent actors, these three dimensions indicate for any interpersonal situation its positivity (i.e. whether someone or something is worthwhile to approach), the relative power (i.e. whether one should be cautious, carefree or courageous), and the intensity and urgency (i.e. how intense and immediate an upcoming action will be and how much time is left for extended reflection and preparation). Verbal signals can cognitively differentiate the ideas, opinions, goals and strategies of action coordination, but they stay emotionally in line with the non-verbal guideposts in order to remain understandable and trustworthy. Non-verbal and verbal communication indicate forthcoming action tendencies, opportunities or necessities in symbolizing the three dimensions of interdependence. Additionally, the kind of action to expect from people can be predicted to some extent from the knowledge of their personality. In sum, the logic of interdependence and the adaptive cultural meaning space, formalized in affect control theory, provide a convincing theoretical basis for the three-dimensional parallels of non-verbal communication and feelings, verbal communication, behavior and personality. As all five serve the function of coordination in myriads of interdependence situations, they all share these fundamental dimensions.

4 Research suggestions based on the three socio-emotional dimensions

The scientific field of human interaction and communication is extremely broad and scattered over many disciplines. If affiliation, power and activation are really such fundamental dimensions as assumed, then an abundance of research results should be available for deepening and enlarging the presented overview. Given the limited space of this article and the partial knowledge of the author, providing a representative sample of results and suggestions is not possible. Yet, some suggestions for further integrative research are offered to attest the fruitfulness of the described perspective, albeit presented as short hints for further reflection.

Neuroscience studies related to the three socio-emotional dimensions exhibit an enormous research potential. For example, Skrandies (1998) localized in an EEG study brain references to the three dimensions of verbal behavior. Todorov (2010) replicated the first two dimensions in his research and found in fMRI studies of face evaluations that the greater the valence (affiliation) of a trait, the stronger the engagement of the amygdala. Certainly, much more neuropsychological research assessing affiliation, power and activation is underway than this author is aware of. In all events, more systematic investigations of neural activations of the three socio-emotional dimensions related to all five research domains would be very fruitful.

Motivation (action tendencies; see Scherer, 2005) should be included within the three-dimensional analysis. The motives of affiliation and power are well established in the literature (e.g. McClelland, 1984), and they correspond to the first two dimensions. The third frequently researched motive, achievement, does not seem to correspond to the third socio-emotional dimension, activation. However, perhaps another corresponding motive is related to this dimension, for example, sensation-seeking. On the other hand, activation alone is content-free, is an intensity dimension, such that there may be no corresponding motive.

In the applied sciences, several dimensional approaches are available for measuring *behavioral styles* (i.e. typical behavior of a person), for example, styles of leadership, of parenting, of conflict management, among others. These constructs all bear strong resemblances to the dimensions of affiliation and power, but they could be 'purified' and improved along the basic dimensions. If these scales are used to measure actual behavior in ongoing events, the third dimension of activation could be added to explore whether it might explain additional variance, as in stereotype research (see below).

For predicting behavioral outcomes, it is useful to *differentiate the affiliation dimension* into the *affective* liking of a person (sympathy–antipathy), the correlated *cognitive* congruence (consensus–dissent) and the *intentional* readiness to affiliate (cooperativeness–competitiveness). These three variables influence each other but have a different impact on the production of new and better knowledge in discussions. Whereas sympathy and especially cooperativeness predict knowledge growth (and consequently effectiveness) in a linear way because of a better exchange of ideas and opinions, consensus exhibits a curvilinear relation. That is, very high consensus leads to poor results because there is not much to learn from each other, and very low consensus leads to similarly poor results because mutual understanding is hampered (Meyer &

Scholl, 2009; Scholl, 1996). Further investigations are needed to corroborate or differentiate these hypotheses.

For predicting behavioral outcomes, it is also necessary to *differentiate the power dimension* into a friendly, respectful use of power, called promotive control, and a hostile, aggressive use, called restrictive control (Scholl, 1999). Restrictive control has nearly opposite consequences to promotive control: The concerned person(s) experience negative feelings, become reactant if they feel strong enough or helpless if they feel too weak, and they lose motivation to engage in joint work (Scholl, 2007b). The powerholders try to justify their restrictive control and bias their perceptions by enhancing themselves and devaluing the other(s) (Kipnis, 1976). They also learn less than those who act promotively. Consequently, the effectiveness of the whole social unit is damaged (Scholl, 1999; Scholl & Riedel, 2010). Future research should extend this line into other areas of economic, social and political transactions.

Although thousands of experimental games have been investigated in psychology, economics, sociology and other sciences, *encompassing interdependence studies* that include all three dimensions inherent in any game matrix seem to be lacking. A systematic variation and analysis of all three matrix dimensions exploring their connections to feelings, non-verbal and verbal communication, personality and behavior would be very informative.

One of the broadly investigated interaction theories is *interpersonal theory* (e.g. Kiesler, 1983), with predictions based on the first two of the three socio-emotional dimensions. Tests have confirmed the predictive validity of friendliness–hostility but not that of dominance–submission (e.g. Strong et al., 1988). Affect control theory would partly deliver alternative predictions as well as introduce the third dimension of activation. Future research awaits a comparative test in carefully selected situations.

In a much-praised book, Tomasello (2008) developed a theory of the *origin of human communication* by thoroughly comparing infants' abilities with those of primates. He argues that human communication rests on a psychological infrastructure of shared intentionality evolved for collaboration and fitness advantages. The threshold from primate to human communication abilities was passed, according to his arguments, through pointing gestures and pantomimes. Yet, the three-dimensional parallels between non-verbal and verbal behavior should also have been important in the phylogenetic development of language because they are the basis of shared intentionality, especially the non-verbal expression of emotions, which develops in the first few months of childhood, much earlier than finger-pointing. Pointing is primarily useful for solving task problems, whereas the three socio-emotional dimensions are necessary for solving the social problems inherent in any interactive endeavor. These reflections beg for new research that integrates both aspects.

The *three dimensions seem to be sufficient for understanding the social world* because no fourth dimension could be consistently secured in the five research areas. Although the cognitive realm is extremely diverse and becomes steadily more diverse through the proliferation of new knowledge, the three basic dimensions integrate all cognitions into a kind of closed socio-emotional world and thus give orientation and guidance. This perspective may be augmented by a comparison with space perception: We can mentally construct four-, five- and higher-dimensional spaces, but our lively imagination does not

go beyond the three dimensions of width, depth and height. The three dimensions of space are not the best representation of the universe as we know from Einstein's relativity theory, but they are apparently suitable for our experiential world. This kind of perception seems to be a useful phylogenetic adaptation to our evolutionary niche; it is ontogenetically a priori (Kant), that is, it is given before any individual experience (Riedl, 1982). In a similar way, the socio-emotional dimensions of affiliation, power and activation have been evolved phylogenetically but are given ontogenetically a priori before any individual experience. Socio-emotionally laden construction and imagination appears to always proceed within these three dimensions, not beyond them.

Fiske, Cuddy and Glick (2006) postulated two '*universal dimensions of social cognition'* by differentiating group stereotypes on the two socio-cognitive dimensions of 'warmth', which is similar to friendliness, and 'competence', which has affinities to dominance. In a new comparative study conducted in Germany, Japan and the US (Schröder et al., submitted), results revealed that the inclusion of the third dimension of activation yields additional plausible differentiations. For example, feminists and Muslims occupy a similar place on the first two dimensions in the US as well as in Germany but they could be clearly differentiated on the third dimension, for which feminists were judged to be much more active than Muslims. The whole range of the 56 group stereotypes amounted to 4.3–4.4 scale units on the activation dimension in all three cultures, with elderly and young people at opposite ends. Thus, we should explore all three 'universal dimensions of social cognition': affiliation, power and activation. By generating research questions grounded in affect control theory, the investigation can advance beyond measuring and describing similarities and differences between cultures by assessing the predictive nature of culturally approved consequential actions (Rogers, Schröder & Scholl, re-submitted).

The *philosophical debate about radical constructivism* (e.g. Von Glasersfeld, 1995) can be enriched by the above argumentation. Whereas radical constructivists emphasize reality constructions in individual heads, we could sketch here a more precise picture of the *social* construction and its guiding principles. Moreover, accepting a more detailed account of how we construct our realities supports the assumption that we may collectively be able to differentiate between more and less valid or 'viable' scientific insights, in spite of the fact that we have 'no direct access to reality'.

The long-standing *philosophical debate about the mind–body problem* can also be enriched. Most philosophers today assume that there are no thoughts and conscious processes without some bodily physical processes located in the nervous system. Conversely, thoughts and mental processes have qualities that differ from physical processes. This widely accepted frame of the problem does not clarify the relation between the mental and the physical. Most philosophical arguments (e.g. supervenience) look only at processes in the individual and thus fail to consider the social embedding of humans. The above-presented research results point to the fact that 'mind' is mainly a social product of mutual construction and understanding, accumulating over generations, which has to be learned and reconstructed individually. According to affect control theory, humans are bound to stick to the cultural socio-emotional experience inherent in language. Conscious thought processes are enabled by socially developed mental constructs and are directed by their socio-emotional orientation. It follows that mind is always composed of social

qualities, whereas the physical processes reside only in the body of individuals. Thus, mental processes cannot be reduced to physical ones or understood as only being built up from them. As Skrandies (1998) showed, words differing in their location in the three-dimensional semantic space elicit the commensurate different nervous activities. Spoken metaphorically, the nervous system is the hardware especially prepared for registering any affective content on the three socio-emotional dimensions. The individual acquisition of the social mind related to these dimensions becomes the software with which we think about the world around us. This culture-specific software permanently has to be adapted in little steps in order to model individual experiences into the social mind, and vice versa. In that sense, a real interaction exists between the physical sphere of individual brains and the socially constructed mental sphere. The consequences are visible as mass opinion change, e.g. as researched by Inglehart (1977).

4.1 Fourth conclusion: Amount, breadth and fruitfulness for interdisciplinary exchange

These few examples of ongoing and noteworthy research using the three socio-emotional dimensions of human interaction and communication can only give a first impression of the amount, breadth and fruitfulness of this junction for interdisciplinary exchange. The spectrum of research questions around these three dimensions reaches from neuroscience to all social science disciplines and extends to basic philosophical questions. Interdisciplinary research and exchange along these lines will enable a deeper insight into human life.

5 Conclusion

Many mammals, most primates, and especially humans, the one primate species that is able to speak, are *social* animals. There are and have been several survival benefits from this kind of sociality, e.g. joint defense, collaborative hunting, and division and specialization of labor, that is, accomplishments of complex tasks that go beyond individual possibilities. In order to reap these benefits, effective coordination mechanisms are necessary. Instead of fixed instincts, humans use the more flexible emotional system as an internal steering device, and they express non-verbally and verbally especially those feelings that are relevant for social coordination. Hence conspecifics can see them, hear them, feel with them and judge whether the other is ready for cooperation, what kind of relation the other prefers or what kind of social problem arises. Coordination may be accomplished either through synchronization (i.e. feeling attracted), spontaneously affiliating with each other and proceeding to joint action. Or it may be accomplished through dominance, that is, a rank order develops in which the dominant individuals give the directions and the subordinate individuals are induced or compelled to follow. This may be enacted in a friendly, promotive manner in which directions are smooth and are more easily followed, or it may be done in a more restrictive way overriding the resistance of the other side. Thus, affiliation, power and their mixtures are the principal modes of coordination among humans. An activation dimension completes the emotion–expression connections,

signaling the urgency of the respective individual agendas and the intensity of the ensuing reactions. These coordination dimensions connect feelings with non-verbal and verbal communication, guide interactive behavior and can be predicted to some extent from personality impressions. Thus, the three socio-emotional dimensions function as important equipment for inclusive fitness by constructing and reconstructing our social world through social judgment and social action.

It follows that this socio-emotional basis of interaction and communication should become a cornerstone of research in all sciences that investigate human sociality. Considerable empirical work remains to be done because many problems are unresolved, but, more importantly, new research ideas can be generated from this perspective. Some examples were presented above. My hopes are that interested readers will generate additional ideas and fruitful hypotheses to advance this argumentation.

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Notes

1 Feeling intensity and arousal or activation may be not identical but they are closely related. We will not go into the details of conceptualization and operationalizations in order to keep the review readable and publishable. Yet, this would be necessary for a more detailed treatment of any kind.

2 A fourth dimension of formality adds a purely cognitive distinction between formal and informal relationships, and is not applicable to traditional small-scale societies.

3 Fontaine et al. (2007) figured ‘unpredictability’ as an independent fourth dimension that signifies the *novelty* itself, but the *check* results in more or less activation.

4 The order, but not the content of presentation, differs from that of Scherer (2005).

5 It is controversial in primate research whether even primates most similar to humans (bonobos, chimpanzees) are able and willing to feel empathy. Most researchers deny that, but in any case it seems clear that humans are further developed in this respect (personal communication from Dr Jana Uher, Free University, Berlin).

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Author biography

Wolfgang Scholl is Professor (em.) in Organizational and Social Psychology at Humboldt University, Berlin, since October 2009 in an externally funded part-time position as researcher. He received a PhD in social psychology in 1975 from the University of Mannheim (http://Scholl.socialpsychology.org/). He is the initiator and co-founder of the private training, consulting and research firm 'artop Ltd – Institute at Humboldt University' (www.artop.de). His research interests lie in the following areas: bases of human interaction and communication; effectiveness of groups; power in organizations; innovation processes in firms, schools, science institutions, and organizational networks; knowledge processes, information pathologies, and decision-making in organizations; co-determination within the German industrial relations system.