Nonverbal Communication

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1. Introduction: Current and promising frameworks for nonverbal behavior

Human communication can be described as a „multichannel reality" (Poyatos 1983, p. 175) consisting of language, paralanguage (i.e. vocal aspects such as intonation) and kinesics. The latter two are referred to as nonverbal behavior. Especially kinesics – in terms of the visual aspects of communication – constitutes a complex system of channels. We know each of these channels from our everyday experience: facial expressions, gaze, gestures, postures, and head and body movements (Wallbott, 1994). It is also widely held that haptics (the use of touch) and proxemics (the use of space) should be classified as nonverbal communication (see Burgoon, Buller, & Woodall, 1989). Moreover, chronemics (the use of time), physical appearance, the use of artifacts or olfactory cues are mentioned as nonverbal cue systems (Burgoon, Buller & Woodall, 1989; Wallbott, 1994) but will not be discussed in the following. Empirical data show that all above mentioned aspects have a strong impact on the process and the results of our communicative efforts and play a vital role in person perception processes (i.e. the process of forming opinions on other people) (Argyle, Salter, Nicholson, Williams, & Burgess, 1970; Mehrabian & Wiener, 1967; Schneider, Hastorf, & Ellsworth, 1979). Summarizing findings from different studies Burgoon (1994) suggests that overall approximately 60-65% of social meaning is derived from nonverbal behaviors – although the impact in a specific situation certainly depends on task, relationship etc. (see paragraph 2). This paper will start with an account of the intellectual history and development of the research area. This will be followed by an account of functions, attributes and cognitive aspects of nonverbal behavior as they are discussed in the relevant literature. In paragraph 2, more specifically, nonverbal behavior in the context of culture, leadership situations and effective communication is targeted. Eventually, an account of open questions is followed by a description of adequate research methods.

1.1 The intellectual history and development

Nonverbal behavior has received considerable attention by a wide range of disciplines, including biology, anthropology, sociology, communications as well as social and experimental psychology (see DePaulo & Friedman, 1998; Burgoon et al., 1989). Until today, this interdisciplinary nature helps protect research from the intellectual biases and sterility inherent in isolation (see DePaulo & Friedman, 1998). However, the interdisciplinary character of the field may also be responsible for the noticeable change of research foci over the years. While, for example, during the 1970s turn-taking behaviors were studied

extensively, this topic has now seemingly vanished from the agenda of most research groups. At the same time, e.g., socioemotional effects are analysed in detail. Regardless of specific research topoi, one development is pervasive: when the research domain of nonverbal communication in the 1960s and 1970s became increasingly important, the explicit goal was to relate specific signals to specific meanings, i.e. emotional states or personality traits. Early manuscripts tended to suggest that – once the meaning of specific cues was known - one might become able to read everyone's emotions like a book. It should be noted that this belief is still held by some authors of non-scientific literature. However, today's scholars stress the enormous complexity of nonverbal behavior and no one would seek to unravel the meaning of specific signals. In contrast to language, nonverbal behavior is not believed to refer to an explicit semantic code. Burgoon and Bacue (2003) conclude: "It is important to underscore the polysemous nature of nonverbal behaviors as well as their substitutability. A single nonverbal cue may have multiple meanings, and the same meaning may be conveyed by a number of different nonverbal cues" (p. 187). It has to be added that nowadays certainly no manner of communication, not even verbal interaction, is still modelled as a one-to-one transmission of meaning from sender to receiver as originally depicted by Shannon and Weaver (1948). Especially representatives of constructivist assumptions or general systems theory (Watzlawick, Beavin, & Jackson, 1967; Maturana, 1978) argue that meaning is not fixed, encoded into a signal, transmitted and decoded but that it is constructed by the receiver and depends heavily on his/her perception of situation and context. Still, nonverbal aspects of communication are even less ascribable to a common semantic code than verbal aspects. This is due to several specific characteristics of nonverbal behavior that make this phenomenon more complex (and thus also more difficult to study) than language and verbal communication. These characteristics will here be distinguished as:

- Processual character/subtle dynamics (see 1.2)
- Context dependency (see 1.2)
- Production and perception outside awareness (see 1.3)

These current and promising frameworks for understanding nonverbal behavior will be described in paragraph 1.2-1.4.

1.2 Attributes of nonverbal behavior

It is nowadays commonly assumed that it is not feasible to establish a list that links specific behaviors to their effects or meaning. In contrast to speech, nonverbal behavior does not refer to an explicit semantic code. This is mainly due to the fact that nonverbal signals are highly

context dependent and that *subtle dynamics* instead of static, isolated elements (e.g. postures) determine interpersonal effects (Grammer, 1990, Grammer et al., 1999). Nonverbal behavior is thus characterized by dimensional as well as processual complexity (see Barker, 1964; Bente & Krämer, 2003).

With regard to *context dependency* several approaches to classify different contexts have been suggested: Bavelas and Chovil (1997; Chovil, 1997) differentiate two forms of contextual information that influence the interpretation of nonverbal cues: cumulative context (topic of conversation, earlier events and behaviors) and simultaneous context (accompanying words, gestures etc.). Similarly, Krämer (2001) mentions (1) attributes of the sender (e.g. gender, age, ethnicity, physical appearance), (2) situation, (3) verbal context and (4) nonverbal context as important modulators. Empirical evidence has first and foremost been presented for the latter three aspects:

Situational context: The so-called Kulechov-effect demonstrates that situational context is sometimes more important for the attribution of a movie character´s emotions than his or her facial expressions (Pudowkin 1961; Wallbott, 1988). The soviet director Lev Kulechov in a short movie sequence combined an actor´s neutral face with either a dead woman´s body, a playing little girl, or a pot of soup. Depending on the context the actor´s neutral face was interpreted as displaying either terror, joy, or contentment (see also the replication of Goldberg, 1951, in a controlled study).

Verbal context: Chovil (1991b) showed that information conveyed by facial displays (more specifically, eye brow movements) is dependent on the verbal context they occur in: „Meaning conveyed by the displays cannot be understood by examining the physical properties of the display by themselves but rather by seeing the actions in their verbal and conversational context. It is through examination of the facial displays in their linguistic context that the discourse functions of facial displays are revealed" (p. 190). The information provided by eye brow movements depending on context varied from emphasis, marked questions and offers, surprise or disbelief to listener attention.

Nonverbal context: As seen above, nonverbal behavior is complex with multiple behaviors happening simultaneously in various channels. Thus, one of the most important contexts for nonverbal behavior is nonverbal behavior (see Bente & Krämer, 2003). In fact, there are many empirical examples for situations in which an activity in one channel affects those simultaneously occurring in another. For example, Grammer (1990) shows that the function of laughter is modulated by additional signals: „the function of laughter could reach from signalling aversion to signalling sexual enticement depending from the postures and

movements which are sent parallel to laughter“ (p. 232). More surprisingly, Frey et al. (1983) demonstrated that the evaluation of Mona Lisa´s smile is dependent on the lateral tilt of her head.

But besides the modulating effect of different contexts, there seem to be additional aspects affecting the effects of a specific behaviour. Interestingly, these aspects seem to lie within the behavior itself: the *movement quality* and *subtle dynamics* inherent in every behavior. As early as 1970 Birdwhistell described the importance of the quality of the movements: “The salute, a conventionalized movement of the right hand to the vicinity of the anterior portion of the cap or hat, could, without occasioning a court material, be performed in a manner which could satisfy, please or enrage the demanding officer. By shifts in stance, facial expression, the velocity or duration of the movement of salutation, and even in the selection of inappropriate contexts for the act, the soldier could dignify, ridicule, demean, seduce, insult, or promote the recipient of the salute. By often imperceptible variations in the performance of the act, he could comment upon the bravery or cowardice of his enemy or ally [or] could signal his attitude toward army life…” (Birdwhistell, 1970, pp. 79-80). Recent studies indicate that the quality of a movement may even have a stronger impact on the observers’ impressions than so-called semantic aspects, although they might not be identified as a possible cause (Grammer et al., 1999). Especially physical properties of body and face movements, such as speed, acceleration, dimensional complexity, symmetry, etc. have been shown to be highly significant. For instance, Grammer, Filova, and Fieder (1997) showed that very subtle changes in women’s movements (a full body turn lasting 3 seconds) could be attributed to whether or not they were interested in a man who was observing this movement. Especially when a specific level of estrogen is reached, women in presence of a man show movements that are more complex but slower. Male observers do not consciously notice these subtle changes, but they nevertheless involuntarily adapt their behavior. These results were generated by means of an innovative videoanalysis tool that merely assessed physical aspects of movement (see 3.1). Krumhuber and Kappas (2005) show that movement quality is equally important when observing facial behavior: The evaluation of a smile as authentic is dependent on the temporal dynamics of the smile.

Against this background, Grammer et al. (1997) even suggest to design a new conceptualization of (nonverbal) communication that radically differs from current category-oriented “body language” approaches that postulate discrete and meaningful movement patterns. In parallel to this assumptions, Gallese and Goldman (1998) posit that perception of nonverbal behavior is mediated by the recently described “mirror neurons” (Gallese, Fadiga,

& Rizzolatti, 1996; Iacaboni, Woods, Brass, Bekkering, Maziotta & Rizzolatti, 1999; Rizolatti, Fadiga, Matelli, Bettinardi, Paulesu, Perani & Fazio, 1996) that are assumed to be activated not only when one conducts a movement but also when observing an action – thus allowing to directly sense the other sender´s intentions, emotional states etc. (for first assumptions into this direction see also earlier literature on emotion contagion and interactional synchrony; Bavelas, Black, Chovil, Lemery, & Mullett, 1988; Bavelas, Black, Lemery & Mullett, 1986; Hatfield, Cacioppo, & Rapson, 1994).

In sum, it can be stated that temporal, i.e. processual, aspects as reflected in the quality of movements play a vital role in nonverbal communication. Burgoon et al. (1989) aptly state that "we need to understand nonverbal communication as an ongoing, dynamic process rather than just a static snapshot of cues or final outcomes at one moment of time" (p. 23). Methodological approaches that take these assumptions into account have been proposed by Cappella and Palmer (1990), Frey et al. (1983) and Grammer et al. (1997; 1999).

1.3 Cognitive aspects

With regard to cognitive aspects of nonverbal behavior Patterson (1994; 1995; 1996) suggests a parallel process model. He criticizes the current procedure of analysing *social behavior* (production aspect of nonverbal communication, encoding) and *social cognition* (perception aspect, decoding) separately. He argues that both processes should be considered in parallel, given that they always occur simultaneously. The two processes mutually affect each other, because they both draw on a finite pool of cognitive resources. However, even in case of the necessity to spend large portions of resources on strategic, controlled behavior, usually both aspects can be processed since person perception might be executed automatically. In fact, Gilbert and Krull (1988) demonstrate that attributions with regard to a job applicant were more accurate when merely small resources were available for person perception - thus forcing participants to engage in automatic processing of nonverbal cues: "The present study suggests that under some circumstances (viz., when non-linguistic behavior is more diagnostic than linguistic behavior) cognitively busy perceivers may be relatively immune to correspondence bias, an error of overprocessing" (p. 201). Choi et al. (2005) also suggest that the degree of automatization for both encoding and decoding is fairly high. Consistent with the definition of automaticity by Bargh (1994) nonverbal communication is seen as unaware, efficient, uncontrollable (i.e. cannot be stopped) and unintentional. Against the background of numerous empirical examples especially from the realm of encoding and decoding of emotional displays they conclude: „Because of the need to act quickly in social life, much of

human behavior has acquired an almost reflexlike nature. This is not to say that we are automatons, completely at the mercy of processes to which we do not have access. Most social tasks are composed of components over which we can exercise a great deal of conscious control. For example, our decisions to initiate social goals can be largely conscious, though we may not be consciously aware of all the steps that are set in motion to fulfil these goals" (Choi et al., 2005, p. 327).

Similarly, Burgoon et al. (2000) assume that unconscious processing – or in their terminology *mindlessness* – is ubiquitous when communicating nonverbally. With regard to the production of nonverbal behavior they state: "Just as language users routinely create grammatical sentences without being able to articulate the rules of grammar, interactants may be relatively unaware of the specific communication tactics they develop in service of their goals (Norman, 1981; Palmer & Simmons, 1995; Reason, 1990)" (p. 109).

Grammer et al. (1999; 1997) as part of their analoguous communication approach (see above) also stress the importance of automatic processing but focus on perception: In line with their above cited assumptions on the importance of subtle aspects such as movement quality they conceptualize the processing of these aspects as largely automatic – without involving direct and conscious cognitive processing. Also, Frey (1999) proposes so-called *inferential communication* with regard to the perception of nonverbal behavior. He assumes that all visually perceptible stimuli possess an overwhelming suggestive force. Referring to Helmholtz´s concept of *unconscious conclusions* he argues that the effects of visual stimuli are not subject to cognitive control but leave us defenceless while at the same time affecting us both immediately and deeply. In this line of argumentation, Buck et al. (1992, p. 962) aptly state that nonverbal communication is „conversation between limbic systems".

1.4 Functions of nonverbal behavior

Functions of nonverbal signals are manifold: They help to structure the course of verbal exchange, they complement our speech activity, they determine our social impressions, and they affect the emotional climate of our conversations. Several classifications of functions have been proposed (see Hecht, DeVito, & Guerrero, 1999): Patterson (1990) differentiates provision of information (on emotional state, personality), regulation of interaction (turn-taking), communication of intimacy, mechanisms of social control (status, persuasion, impression management), presentation of identity, affect management (maximizing of positive and minimizing of negative affect, e.g., using touch) and facilitation of formal situations. Burgoon and Bacue (2003) similarly distinguish (a) expressive communication, (b)

conversational management (in terms of the "lubricant that keeps the machinery of conversation well oiled", p. 192), (c) relational communication (including social support, comforting, and conflict management) and (d) image management and influence processes. In an attempt to unify several approaches, Bente and Krämer (in press) suggested three functional levels of nonverbal behavior: (1) *Discourse functions* (behaviors like pointing or illustrative gestures that are closely related to verbal behavior, Efron, 1941; Ekman & Friesen, 1969), (2) *Dialogue functions* (behaviors that serve the smooth flow of interaction when exchanging speaker and listener roles, Duncan, 1972), (3) *Socioemotional functions* (behaviors affecting person perception, evaluation and interaction climate).

With regard to general functions of nonverbal behavior pertaining to socioemotional aspects, in recent years a controversy emerged. The assumption that emotion and expression are directly linked and that emotional states automatically lead to expressions specific for the respective emotion (Izard, 1997; Tomkins, 1962; Ekman, 1997, see Manstead et al., 1999 for a review) has been challenged: Researchers following the so-called 'social-communicative view' (Chovil, 1991a; Fridlund, 1991a; Russell, 1997) argue that emotional nonverbal behaviors are not determined by emotional states but exclusively by social intentions. Referring to empirical findings and evolutionary psychology Fridlund (1991a) argues in his 'behavioral ecology view' that it is simply dysfunctional to directly show one´s emotional states. Instead, individuals use their emotional displays in a socially reasonable and manipulative way (e.g. not to cry when one is saddest but to cry when assistance is most readily available). In sum, nonverbal behavior (such as facial displays) is seen as motivated by social goals and intentions, not by emotion; the behavior is seen as strategic, but still as automatic and unconscious. Empirical evidence confirms that facial displays are more pronounced in social situations (Fridlund et al., 1992; Fridlund, 1991b; Chovil, 1991a; Kraut & Johnston, 1979; Fernandez-Dols, Sanchez, Carrera & Ruiz-Belda, 1997). In fact, there is ample evidence that the social situation strongly affects nonverbal behavior. On the one hand, it has been demonstrated that people behave differently when others are present compared to when they are alone: For example, Brightman, Segal, Werther, and Steiner (1977) show that people eating a salty sandwich on their own do not show any reaction, but when they are in the presence of others they strongly display their dislike. Also, the smiling of 18 month old children depends almost exclusively on the visual attention of the mother (Jones & Raag, 1989). This has been taken as evidence for the notion that nonverbal behavior is solely motivated by social goals. On the other hand, more sophisticated studies demonstrate that the type of audience also has a significant influence. For example, friends elicit other behaviors

than strangers do. In an excellent review on the impact of social situations on nonverbal behavior Wagner and Lee (1999) identify the *role* of the other person (coaction usually leads to facilitation of facial expressions, and being observed leads to less facilitation, or to inhibition) and the *relationship* between the people involved (if the people present are friends or acquaintances, facilitation emerged; if merely an experimenter or observer is present inhibition occurred) as important determinants for the elicitation of nonverbal behavior in social situations. In sum, it can be concluded that most evidence points to the enormous influence the sociality of the situation has on the nonverbal behavior – affirming the notion that nonverbal behavior serves social goals. In consequence, nonverbal behavior is seen as a vital means to automatically manipulate interlocutors (for a review see Manstead, Fischer & Jacobs, 1999; Krämer, 2001), for example in the course of impression management (i.e. self presentation, a phenomenon that nowadays is also modelled as ubiquitous, strategic, automatic and occurring without the individual´s awareness, Leary, 1995). Thus, Wagner et al. (1992) argued in favour of a functional account of nonverbal behavior in line with impression management theories: "People use facial and other nonverbal behavior to communicate. … We believe that such an approach puts expressive behavior more firmly into social psychological theory, and renders unnecessary the invocation of the limited concept of cultural display rules" (p.18).

In sum, it can thus be concluded that nonverbal behavior and its effects are highly complex and that single cues cannot be translated directly into distinct meaning. Nonverbal behavior is characterized by a high *dimensional complexity* which results in the effects of single cues being dependent on the occurrence of other cues and a high *processual complexity* which articulates itself in the importance of the quality of movements (e.g. in terms of the effects of subtle dynamics). Moreover, nonverbal behavior has been shown to be produced as well as perceived automatically and outside awareness. Last but not least, nonverbal behavior constitutes an important means of impression management and serves social goals by – also automatically and non-consciously – manipulating the social environment.

2. Current research and its findings

This section will give an overview of current findings and promising research with regard to specific research fields. First, two aspects will be targeted that exert influence on nonverbal communication: culture and setting with regard to status and dominance (in terms of

leadership settings). Finally, characteristics of effective versus ineffective communication will be specified, again drawing on the situations and settings mentioned above.

2.1 Influence of culture

"I am convinced that much of our difficulty with people in other countries stems from the fact that so little is known about cross-cultural communication" (Hall, 1959, p.10). Unfortunately, this statement is still true today. Within novels or movies, misunderstandings in cross-cultural communication have been highlighted frequently, but academic coverage of the topic is unsatisfactory. If anything can be found in the area of nonverbal communication, findings are mostly anecdotic. Research is scarce and superficially focuses on emblems, proxemics or facial expressions. Even fewer studies take subtle movement qualities and other subtle cues into account. Here, a first approach by Grammer and colleagues (1999) indicates that there are differences between Japanese and German participants in terms of gaze and speech but none with regard to movement quality.

A summary of findings (see below) suggests that there are different layers of behavior ranging from complete universality to pronounced dissimilarity. While subtle signals with a genuine temporal pattern like the eye-brow flash (Grammer et al., 1988; Eibl-Eibesfeld, 1972) do not differ across cultures, especially those nonverbal behaviors that are closely tied to language (e.g., the gesture categories emblems and illustrators; Efron, 1941) differ heavily. Burgoon et al. (1989) refer to LaFrance and Mayo (1978) and state that „the innermost core represents nonverbal behaviors considered to be universal and innate; facial expressions of some emotional states belong to this core. Next come the nonverbal behaviors that show both uniformity and diversity; members of all cultures display affect, express intimacy, and deal with status but the particular signs of doing so are variable. Finally, there are culture-bound nonverbal behaviors which manifest great dissimilarity across cultures – language-related acts such as emblems, illustrators, and regulators show this diversity most clearly" (p. 73).

Even more surprisingly, there is almost no systematic research on cross-cultural communication. In most cases, merely differences between cultures are described and actual problems or misunderstandings have to be inferred from these. In the following, the empirical results will be described. Implications for cross-cultural communication and training will be discussed in the last paragraph of the section.

Gestures: Since *emblems* are gestures that have a direct verbal meaning and are closely related to speech (e.g., the peace sign), they are not shared across cultures. In some cases, similar gestures occur but have different meanings – a fact that can easily compromise

someone not familiar with cultural specifics. Thus, Richard Nixon was met with disapproval when doing the "A-OK" gesture when arriving in Latin America, where it unfortunately is an obscene gesture (see Burgoon et al., 1989). Other emblems possess contradictory meaning when displayed cross-culturally, for example the Bulgarian shaking their head for "yes" and using an upward the head throw for "no" (Burgoon et al., 1989). Also, the speech accompanying *illustrative gestures* have been shown to vary across cultures (Efron, 1941).

Proxemics: Hall (1959, 1966) found that the interpersonal distance people use in different kinds of social encounters varies across cultures. He differentiated contact (e.g. Latin Americans, French, Arabs) versus non-contact cultures (e.g. Germans and US). Burgoon et al. (1989) offer a critique of this approach and argue that context factors (such as gender, experimental setting) should be considered more carefully. Although they also affirmed intercultural differences, Sussman and Rosenfeld (1982) observed that when Japanese and Venezuelan communicators spoke English they adopted distances similar to those of Americans.

Facial expressions: The research on the cultural specificity of facial expressions – that according to Kupperbusch et al. (1999) is the area that is most extensively studied with regard to cultural context – basically started with Darwin´s (1872) book *The expression of the emotions in Man and animals.* Although he stated that there are "strong biological underpinnings for (and hence universality in) the communication of intimacy, affiliation, aggression and so on" (DePaulo & Friedman, 1998, p. 5), there is also ample evidence that there are cultural differences regarding both production and recognition of facial displays. With regard to the *production* of facial expressions merely a few studies have been conducted. The most important conclusion that has been drawn from the results is that so-called *display rules* exist, i.e. culturally learned rules regarding the appropriateness of showing certain expressions in certain situations (Ekman & Friesen, 1969). This assumption has been confirmed by Ekman (1972) and Friesen (1972) who presented videoclips eliciting disgust to Japanese and American participants: There were no differences when participants thought they were alone, but when interviewed after the presentation the Japanese masked disgust with smiling. In a better controlled version of the same procedure Matsumoto and Kuppersbusch (2001) showed that participants from collectivist countries (e.g., Japan) tend to conceal both positive and negative emotions when others are present. Moreover, social context factors modulate these results: Participants from individualistic countries (e.g. US) consider it more appropriate to mask negative emotions when interacting with an outgroup

(e.g. business partners), while people from collectivistic cultures are more likely to mask negative emotions in the ingroup (e.g. family).

With regard to *recognition* of facial expression, most data comparing literate and preliterate cultures support the notion of universality (Ekman, 1972; Ekman & Friesen, 1971; Izard, 1971). However, it should be noted that the method of using photographs of in most cases posed (i.e. non-natural) expressions has been heavily criticized (Russell, 1997, Wierzbicka, 1995, for a review see also Kuppersbusch et al, 1999, and Parkinson, Fischer & Manstead, 2005). In a more sophisticated study, Matsumoto (1992) showed that American subjects were better able to recognize anger, disgust, fear and sadness than Japanese subjects, but that there was no difference for happiness or surprise. This is interpreted as avoidance of emotions that threaten group harmony: these are neither shown nor recognized.

Immediacy: Cues communicating immediacy in western culture (high expressivity, close proximity, direct facing and eye contact, touch) may be considered overly direct, aggressive, or invasive in other cultures (Burgoon & Bacue, 2003). For example, Indonesians use less direct body orientation than Australians (Noesjirwan, 1978). But on the other hand, Arabs use more direct body orientation than Americans (Watson & Graves, 1966). In the US it is expected that a stranger smiles in response to another person's smile, but this pattern is uncommon in Israel (Alexander & Babad, 1981).

Gaze: In contrast to many western cultures, people from Asian and African cultures are taught to avoid eye contact (Burgoon et al., 1989; Byers & Byers, 1972; Bond & Komai, 1976). Hence, direct or frequent gaze may be regarded as rude or a violation of privacy (Burgoon & Bacue, 2003). Arabs, on the other hand, engage in more eye contact than Americans (Watson & Graves, 1966).

Intercultural communication and resolving conflict

Although almost no research in cross-cultural settings has been conducted, it can of course be inferred from the results summarized above that the usage of culture specific behaviors might confuse, irritate or even provoke an interlocutor with a different cultural background. Nevertheless, our understanding of what actually happens when people from different cultures meet (whether e.g. there is automatic adaptation on subtle layers of nonverbal behavior etc.) is still incomplete. Also, we do not know yet whether there are also differences with regard to movement quality or other subtle aspects of behavior (see 1.2). Here, research is just beginning (Grammer et al., 1999; see also recent research grant FK/SFB 427-B3 of the German Science Foundation to Bente and Krämer). Within the latter project, differences in nonverbal movements of video-recorded dyads from the US, Germany and the United Arabic

Emirates will be analyzed in detail. Experimental settings using the original videos as well as computer animated versions concealing the cultural background of the two interactants will help to address the question whether person perception and evaluation is led by cultural stereotypes (as culture is recognizable in the original video recording) or the specifics of nonverbal behavior (as the computer animated sequences merely disclose movement behavior and conceal culture).

Manusov (1999) has already demonstrated that stereotypes and expectations about how people from a different culture will behave affect what people see and how they themselves behave during conversations. If, for example, people have a positive attitude (which may or may not be determined by a stereotype) they show more direct body orientation and more gaze – especially during the first five minutes of an interaction. But Manusov (1999) also shows that if stereotypes are violated, we are influenced by how people actually behave.

In order to resolve conflict and intercultural misunderstandings, Burgoon et al. (2000) – against the background that conflict is characterized by relatively mindless cycles of blaming – suggest mindfulness: "competent conflict management tactics appear to be those that increase the mindfulness of conflict behavior by bringing unstated assumptions under scrutinity, more clearly articulating the positions of self and other" (p. 119). However, Burgoon et al. (2000) with regard to cross-cultural interactions also express reservations with regard to what is often seen as the ideal way to resolve conflict: to find common ground. This is seen as potentially dangerous in intercultural interactions, because it may distract partners from existing differences: "this presumption of communality in fact may be an unrecognized contributor to many intercultural communication difficulties" (p. 119).

However, the knowledge about and salience of differences alone is probably not sufficient. Also, as Burgoon et al. (1989) state simple exposure to another culture does not guarantee more accurate nonverbal communication (see Michael & Willis, 1969, for early results). Burgoon et al. (1989) instead suggest that training in the production of culture-specific cues is necessary. The usefulness of such training has been demonstrated by Collett (1971) who trained Britons to behave nonverbally like Arabs. As a result, these Britons were rated more favourably than untrained British communicators (see also Garrat, Baxter, & Rozelle, 1981, who trained white policemen to communicate more efficiently with Afro-American interactants). On the other hand, such training concepts clearly rely on (a) the knowledge given and (b) the possibility to consciously choose and produce adequate signals. This may well be possible when learning emblems, as these are researched well, relatively

easy to learn and might be produced consciously. However, with regard to more subtle and often automatic signals such as head movement activity this approach will be less useful (for alternative approaches, see 3.3).

2.2 Nonverbal communication in leadership settings

Although it is frequently stated that the analysis of nonverbal behavior is of great importance when studying leadership (Gitter, Black, & Goldman, 1975; Gitter, Black, & Walkey, 1976; Gitter, Black, & Fishman, 1975) there has been surprisingly little research directly examining nonverbal communication processes (Anderson & Bowman, 1999; Riggio, 2005). Uhl-Bien (2004), for example, suggests that the leader´s nonverbal communication skills are crucial for building effective leader-member relationships. Berger (1985) even states that "It can be argued that […] nonverbal behaviors are more significant in determining the experience of power than are variables related to verbal content. One conclusion to be drawn here is that failure to take into account nonverbal behavior in the study of communication and power relationships is to doom oneself to study the tip of a very large iceberg" (p. 483).

The most prominent concept in leadership settings that is closely tied to nonverbal communication is that of charismatic leadership. The specific behavior of the leader is seen as a crucial variable (Friedman, Prince, Riggio, & DiMatteo, 1980). Those patterns of nonverbal behavior that convey a sense of the leader´s enthusiasm and confidence are emphasized as particularly important (Riggio, 1987). According to Cherulnik, Donley, Wiewel, and Miller (2001) charismatic behavior is characterized by nonverbal expressiveness and immediacy. As already posited by Weber (1921/1946) this is efficient because a charismatic leader elicits emotional arousal in followers. The phenomenon of emotional contagion is thus seen as a possible mediator why the nonverbal expressiveness of the leader should positively affect the followers. This view holds that the observation of the leader´s facial displays leads to the automatic mimicry of facial movements and subsequently - due to the interlinkage of facial muscles and brain regions associated with emotions (see facial feedback theory, Zajonc, Murphy & Inglehart, 1989) – to the corresponding feelings in the follower. It has been demonstrated empirically that people do indeed react with corresponding emotions to televised emotional expressions of political leaders (Masters & Sullivan, 1993). However, in line with the assumptions discussed above (see 1.2) the interrelationship of a leader´s nonverbal behavior, the viewer´s emotions and lasting attitudes is extraordinarily complex: Masters and Sullivan (1993) identify at least sixteen different variables that seem to moderate the followers´ reaction to watching a political leader. Also, Cherulnik, Donley, Wiewel, and

Miller (2001) showed that charisma is contagious: in one laboratory study and when utilizing televised presidential debates they showed that at least the nonverbal behavior is contagious – but only if the leader exhibits truly charismatic behavior.

Another approach that is used to explain leadership behavior is the model of the bases of social power by French and Raven (1959). They state that social influence and power might be based on (1) reward (resulting from the ability to provide positive reinforcement), (2) coercive power (reflecting the potential to exert punishment), (3) referent power (based on the relation of influencer and influencee in terms of respect and esteem), (4) legitimate power (based upon authority recognized in accordance with position in an organizational structure), (5) expert power (form of referent power resulting from recognized expertise), (6) informational power (variation of legitimate power resulting from the ability to control the availability of information, Collins and Raven, 1969).

Leaders thus might refer to different power bases and influence the follower either by rapport (referent power), by power (legitimate power), or by incentives (reward/coercive power). In order to work within everyday interactions, these power bases necessarily have to be accompanied by adequate nonverbal behaviour. However, little is known about the nonverbal correlates of these types of social power. Bente (1984) demonstrated that coercive and expert power are accompanied by increased general head movement activity while referent power is characterized by a head movement activity below average. Krämer (1997), on the other hand, showed that coercive behavior is accompanied by decreased sagittal head movement (up and down movements) while it is increased when referent power is exerted.

With regard to influence and persuasion and their connection to nonverbal communication there is also less research than would be desirable. A meta-analysis of fifty studies indicates that gaze, touch (i.e., light touch on upper arm or shoulder), moderately close distances, and professional clothing are associated with successful compliance gaining (e.g., with regard to signing a petition, loaning money etc.) (Segrin, 1999). More surprisingly, evidence is given that verbal compliance gaining techniques are no more effective than nonverbal.

Apart from these approaches there is a large amount of research not directly connected to leadership but to the concept of dominance. Burgoon and Bacue (2003) argue that "Nonverbal behavior is a major avenue for communicating power, dominance, and status in everyday interactions and may even form a universally recognized vocabulary by which a given social community interprets and expresses privilege and control (Burgoon & Dillman, 1995; Henley, 1995)" (p. 200). According to Dunbar and Burgoon (2005b; Burgoon & Bacue,

2003), dominance can be conceptualized as the behavioral manifestation of the relational construct of power – the latter being defined as the capability to produce intended effects. Unlike Rollins and Bahr (1976) who originally argued for a linear relationship between dominance and power, Dunbar and Burgoon (2005b) assume a curvilinear relationship: partners who perceive their power as extremely high or low will use fewer control attempts and dominance behaviors than partners who perceive their partner as of similar power as themselves. Further, Burgoon and Dunbar (2000) model interpersonal dominance as a dynamic, situationally contingent social skill. They empirically verify the notion that there are strong commonalities between the communication style of socially skilled people and interpersonal dominance by demonstrating that people with greater self-reported social skills are perceived as more dominant. Both, socially skilled and dominant people are better at expressing themselves verbally and nonverbally, at controlling their presentations to foster a favourable impression, and at conveying confidence, friendliness, and dynamism. This relation is seen as resulting from the fact that, within our culture, dominance is evaluated positively: "Preference is given to the dominant rather than the submissive end of the behavioral continuum" (Burgoon & Dunbar, 2000, p. 116). Results also support the assumption that dominance displays are adapted to communicative circumstances and thus support the view of interpersonal dominance as a situationally and relationally contingent social skill. The results of Driskell and Salas (2005) and others (Carli, LaFleur, & Loeber, 1995; Driskell, Olmstead, & Salas, 1993), on the other hand, suggest that dominance behavior is a generally ineffective influence tactic in groups and leads to negative evaluations from others such as incompetence, resentment, and dislike. The approach of Kalma, Visser, and Peeters (1993) might provide a possibility to integrate the different results: They distinguish sociably dominant (characterized by positive social relationships) and aggressive dominant people (low on socioemotional leadership) and give evidence that these two groups differ with regard to nonverbal behavior. Socially dominant people look more directly at the person speaking, use more gesticulation (which according to Freedman, 1972, represents a strong communicative intention) and show prolonged gaze pattern during turn taking – thus indicating more directly from whom they expect a reaction. Within leaderhip contexts, sociably dominant people using these kinds of immediacy signals thus seem to possess the capacity to influence followers via referent power and building rapport. In consequence, they can be expected to be successful relationship-oriented leaders (see Michigan studies that differentiate relationship-oriented and task-oriented style, Likert, 1961), and successful with

"consideration" instead of "initiating structure" style (see Ohio state studies, Fleishman, 1953).

In general, there has been extensive research on which nonverbal cues signal dominance. Here, merely a short summary can be presented. Comprehensive overviews are given by Anderson and Bowman (1999), Burgoon, Buller, and Woodall (1989), Dunbar and Burgoon (2005b), and Krämer (2001). According to Burgoon et al. (1989) the literature is organized by channel/code because most of the research has targeted one or two isolated behaviors and their correlation with status, dominance, or dominant personality traits.

With regard to the *face* it has been found that the absence of a smile and lowered brows, in terms of a stern, angry face, convey dominance (Edinger & Patterson, 1983; Henley, 1977; Keating, 1985; Keating, Mazur, and Segall, 1977; Mehrabian & Williams, 1969; Bucy, 2000). It is still controversial, though, whether smiling is actually related to submissiveness (pro: Burgoon & Bacue, 2003; Edinger & Patterson, 1983; Henley, 1977; Keating, 1985; Keating & Bai, 1986; Keating, Mazur & Segall, 1977; contra: Aries, 1987; Carli et al., 1995; Hall, 1984; Hall & Halberstadt, 1986; see also LaFrance & Hecht, 1999).

The *kinesic* cues that have been shown to communicate dominance are the so-called relaxation cues, e.g. backward or sideward lean, relaxed hands, asymmetry of arms (Meharbian, 1969a, b, 1972). However, most of the cues have not been verified in other studies (Aguinis, Simonsen, & Pierce, 1998; Carli et al., 1995). Other cues that have been identified to be related to dominance are physical activity, frequent and expansive gestures and dynamic expressive displays (Henley, 1977; Mehrabian, 1969a; Mehrabian & Wiliams, 1969; Remland, 1982).

According to Burgoon and Bacue (2003) *proxemics and haptics* work in tandem: both convey dominance when personal space is invaded and when these signals remain unreciprocated (Remland, 1982). Thus, power and control are communicated through the initiation of touch (Burgoon & Saine, 1978; Henley, 1977; Patterson, Powell & Lenihan, 1986) and more dominant people claim larger territories in terms of the fact that others keep a distance from them (Meharbian, 1969a).

Results with regard to *gaze* are ambiguous – with some studies suggesting that dominant people look more (Thayer, 1969; Strongman & Chapness, 1968) and others demonstrating that submissive people gaze more at dominant people (Exline, 1972). The different results have been integrated in a model taking the importance of speaker role into account: Dominant people show a higher looking-while-speaking to looking-while-listening ratio (Dovidio, Ellyson, Keating, Heltman, & Brown, 1988; Exline, Ellyson & Long, 1975).

Dominant people thus "can stare more but have to look less" (DePaulo & Friedman, 1998, p. 12). In a study of a military organization Exline et al. (1975) gave evidence that cadets who paid visual attention to low-status persons were rated low in status. They concluded that "one is not obligated to look at lower-status persons and may actually lose status by doing so" (p. 323).

Although research has thus identified various cues that indicate dominance, Dunbar and Burgoon (2005b) aptly advise to be cautious and to not infer the effects on a perceiver just from one cue: "dominance is a multi-faceted construct that can be demonstrated interactively in many ways and whose meaning depends on the context and the perceiver" (p. 228). One of the most important downsides of the discussed research, however, results from its ethnocentric nature: Most studies have been conducted within the US and in Europe. To the extent that the studied behavior patterns are not universal, the results may not be found in other cultures.

In sum, it can be stated that there are some results on cues that demonstrate dominance but the current knowledge does not allow for the proposal of rules for optimal behaviour (and given that here, too, subtle dynamics might play an important role it can even be questioned whether this would be useful at all). Nevertheless, most approaches (charismatic leadership, Burgoon´s work on dominance, results on persuasion) suggest that expressive and immediate nonverbal behavior is most effective – at least when practicing relationship-oriented leadership. Also vital within this context might certainly be the leaders´ ability to adequately interpret the nonverbal cues of their followers. The general result that sensitivity to nonverbal cues can determine social success will be described within the next section on effective communication.

2.3 Behavioral characteristics of effective vs. ineffective communication

If any results on effective nonverbal communication can be found it is largely centred on social skills and rapport. Gesturing and expressivity have been demonstrated to be the most significant predictors of rapport and social skills (Bernieri et al., 1996; see Dunbar & Burgoon, 2005b). Bernieri et al. (1996, p. 124) conclude "What is expressive is good. People who gesture and talk a lot are judged to be gregarious, dominant, not lazy, motivated, and socially skilled; …People who smile and are talkative are warm and not quarrelsome. It is not any wonder that expressivity has been considered synonymous with charisma (Friedman, Prince, Riggio, & DiMatteo, 1980)". In general, the result that expressive people are successful communicators and that they are reliably more extraverted, dominant, impulsive,

playful and popular is pervasive (Dunbar & Burgoon, 2005b; DePaulo & Friedman, 1998). Expressivity does not only lead to increased attribution of attractiveness (DePaulo, Blank, Swain & Hairfield, 1992) but sustainably affects every interaction: "Expressiveness instantly makes a difference in setting the tone of social interactions. Studies of commonplace interpersonal behaviors such as walking into a room and initiating a conversation (Friedman, Riggio, & Casella, 1988) or greeting someone who is approaching (Friedman, DiMatteo, & Taranta, 1980), suggest that this social skill is immediately influential" (DePaulo & Friedman, 1998, p. 13).

Feldman, Phillipot, and Custrini (1991) in a review on social competence and nonverbal behavior moreover show that not only these encoding but also decoding skills can be viewed as a manifestation of social competence. According to various results, sensitivity to nonverbal cues can determine social success: teachers, therapists, and foreign service officers who score higher with regard to decoding ability are more talented at their jobs (Rosenthal et al., 1979). Doctors who are good at reading body cues have even been shown to have more satisfied patients (DiMatteo, Hays, & Prince, 1986). Thus, in sum "research indicates that individuals who exhibit nonverbal skills … tend to have more academic and occupational success, larger and more effective social networks …, more satisfying marriages, and decreased levels of stress, anxiety and hypertension" (Burgoon & Bacue, 2003, p. 208). The description of these skills, though, does not go further than to simply state that people are more expressive (with regard to gestures, bodily dynamics, facial displays) or achieve higher values with regard to decoding ability.

Another research realm closely related to effectiveness of communication and its behavioral correlates is that of interactional synchrony or mimicry. Various terms are in use: reciprocity und compensation (Argyle & Cook, 1976), mirroring (Bernieri & Rosenthal, 1991), conversational adaptation (Burgoon, Dillman, & Stern, 1993), simulation patterning (Cappella, 1991), synchrony (Condon & Ogston, 1966), congruence (Scheflen, 1964; Kendon, 1973), motor mimicry (Bavelas, Black, Chovil, Lemery, & Mullett, 1988; Bavelas, Black, Lemery & Mullett, 1986; Lipps, 1907) or accomodation (Giles, 1980; Giles, Mulac, Bradac, & Johnson, 1987, for a review see Manusov, 1995; Wallbott, 1995). Wallbott (1995) gives a comprehensive definition of the phenomenon: „the tendency to exhibit such nonverbal (and verbal) behaviors that resemble those of our interaction partners, when we evaluate them positively or when we want to be evaluated positively by them" (p. 93). This definition already includes the notion that interactional synchrony is associated with rapport or positive evaluations of the interaction partner. Drawing on Tickle-Degnen and Rosenthal (1987), who

theoretically linked interpersonal coordination, attentiveness and positivity to rapport, Bernieri and Rosenthal (1991), give evidence that we coordinate our behavior to a greater degree when interacting with others whom we like. Also, interactional synchrony was found to be an important predictor of self-reports of rapport (see also Bernieri, Gilles, Davis, & Grahe, 1996; Hess, Philippot, & Blairy, 1999; LaFrance, 1982; Scheflen, 1964). Moreover, within recent approaches that conceptualize mimicry in line with social cognition assumptions of automaticity as nonconscious, passive and unintentional (Chartrand & Bargh, 1999; Van Baaren, Holland, Kawakami & van Knippenberg, 2004) it was demonstrated that mimicry facilitates the smoothness of interactions, increases liking between interaction partners and fosters prosocial behavior. Kendon (1970) as well as Condon and Ogston (1966), however, did not show that synchrony is associated with positive evaluation but rather due to similarities in attitudes and mimicking of superior persons.

But similarly as with regard to most research realms, a word of caution is in order: Studies using more sophisticated or innovative methods indicate that it is worthwhile to analyze the phenomenon closely (i.e., considering subtle aspects of nonverbal behavior and their precise timing). Using time-series analysis, Cappella and Planalp (1981) demonstrated that reciprocal influence exists with regard to *matching* but also with regard to *compensation*. Grammer, Kruck, and Magnusson (1998), by means of a sophisticated search algorithm (see 3.1), indicated that synchronization in gender-heterogeneous dyads does not necessarily have to be directly observable but shows in rhythmic patterns. „Highly complex patterns of behavior with a constant time structure" (p. 3) are idiosyncratic for the dyad and indicate interest for the partner.

2.5 Conclusion: What don´t we know?

When recollecting the findings cited above, it might on the one hand be stated that we already have a satisfying amount of knowledge - at least with regard to cultural differences concerning flamboyant cues, nonverbal correlates of dominance and immediacy cues necessary to build rapport. On the other hand, it becomes apparent that we lack detailed knowledge, for example with regard to the exact cues and movements comprising dominance cues or expressivity. Actually, most research on cultural and social influence as well as on leadership and effectiveness has not yet taken into account that nonverbal communication largely relies on subtle, dynamic patterns and specific movement quality (see 1.2). Instead, research focussed on single cues such as posture, smiling, proxemics that are assessed easily when ignoring their dynamic, temporal attributes. Especially with regard to the research

targeting behavioral correlates of effective communication it became apparent that merely methods considering the exact pattern of mutual influence might unravel the antecedents and consequences of interactional synchrony and mimicry.

Moreover, the different research domains have rarely been connected to each other. For neither nonverbal communication in the context of leadership nor behavioral characteristics of effectiveness, studies have been conducted in cultures outside North America and Europe. The results can thus hardly be generalized to humankind. For example, there are no data on appropriate leadership and dominance behavior for Asia or Middle East – let alone with regard to subtle dynamics. In consequence, it is open whether charismatic behavior would also be efficient when communicating cross-culturally. Indeed, the fact that immediacy behaviors in some cultures are experienced as inappropriately direct (see 2.1) suggests that at least some cultures would be repelled by charismatic behavior.

Also, leadership and efficiency of behavior have – except for the area of charismatic behavior – rarely been connected. What characteristics are needed to lead, for example, efficient negotiations (possibly cross cultural) has not been studied with regard to single cues - not to mention subtle movement qualities.

3. Methods and technologies

Given the complex nature of nonverbal communication as described above, one has to carefully select the methods capable of capturing all relevant aspects. When planning to study the *structure* of nonverbal communication (e.g., of two people interacting), it is essential to incorporate time in order to take processual complexity into account (see 3.1). When trying to unravel the *effects* of nonverbal cues, one should keep in mind that these effects depend heavily on context, and that nonverbal behavior is often produced and perceived automatically and without the individual's awareness (see 3.2).

3.1 Assessment of nonverbal behavior and subtle dynamics

Being aware of the complexity of nonverbal communication, Monge and Kalman (1996) stress the importance of methods that take into account that nonverbal behavior is a process that develops over time: „Human communication is a dynamic, unfolding process. .... The passing of time is so integral to communication, a facet of living experience always so ready at hand, that it tends to escape scrutinity in its own right as a dimension of analysis" (p. 71). Cappella and Palmer (1990) point out that specific relations, for example with regard to the

dynamic interaction of two conversation partners (see paragraph 2.3), might only be detected when measuring on a timeline: „...in order to understand when covariation is truly simultaneous, rather than simply occurring in the same interaction, one needs to have temporal data" (p. 144). Nevertheless, most studies conducted rely on "distributional" instead of "temporal" data (Cappella & Palmer, 1990).

One of the few instruments for measuring human movements in a highly detailed manner over time is the Bernese System for Time Series Notation (Frey et al., 1983; for an overview see Donaghy, 1989). Using a video, a human coder annotates the position of every part of the body at predefined intervals (most commonly every 0.5 seconds). Nowadays, also automatic tools like motion capturing devices can be employed for assessing the behavior. It has already been shown that the subsequent analysis yields meaningful results that are similar to those gained by the Bernese System (Altorfer, Jossen, & Würmle, 1997). In order to focus on the assessment of behavioral dynamics, Grammer, Fieder, and Filova (1997) developed an automatic videoanalysis tool called *Automatic Movie Analysis*. By *Image Differencing* (Sonka, Hlavac & Boyle, 1993) the successive images of a video are compared in order to identify the amount of movement. Thus, merely motion energy, i.e. the intensity of movements is assessed.

For the analysis of the resulting data multivariate time series procedures have been proposed. Cappella (1996) highlights the benefits of these methods: „Time series procedures can unravel signal from noise and detect and quantify the relationship between the partners´ behaviors. Without such procedures, it would be almost impossible to know about the presence, type, and magnitude of adaptation behaviours" (p. 382, see also Cappella & Flagg, 1992; Monge & Kalman, 1996). Grammer, Kruck, and Magnusson (1998) propose the *pattern detection software* THEME that identifies complex significant patterns within the behavior – given that the temporal process has been assessed adequately.

3.2 Avatars and agents as tools to study the effects of nonverbal behavior

With regard to studying not the *structural aspects* of nonverbal behavior but the interpersonal *effects* of specific cues other problems arise. An experimental approach would be the preferred choice but employing confederates or actors who vary particular aspects of their nonverbal behavior is problematic, because most nonverbal behaviors are not consciously controllable (see 1.3). For example, Lewis, Derlega, Shankar, Cochard, and Finkel (1997) could show that the experimental variation of touch behavior was confounded by simultaneous variations in other nonverbal channels. They concluded that "in spite of specific

instructions to keep nonverbal behavior consistent, confederates in the touch versus no touch condition displayed different behaviors. Confederates who touched used more nervous gestures and fewer expressive hand gestures compared to those who did not touch" (Lewis et al., 1997, p. 821). Other investigators tried to solve such problems by using photos, drawings or puppets that could be controlled more easily and precisely than actors (Frey et al., 1983; Schouwstra & Hoogstraten, 1995). Despite some seemingly encouraging results, all these studies have been restricted to the investigation of *static* and easily manipulated features of nonverbal behavior such as postures or positions of specific body parts. The only possibility to study the effects of dynamic behavior lies in the employment of human-like virtual persons such as agents and avatars whose behavior can be controlled systematically (Bente, Krämer, Petersen, & de Ruiter, 2001; Blascovich et al., 2002). In the following, current approaches and their prerequisites are presented.

3.2.1 Current approaches

Three different approaches to advance knowledge in the realm of nonverbal communication will be described: (1) The use of protocol-based, computer animated virtual figures to conduct systematically controlled experimental research, (2) a computer simulation approach that exploits the implementation of current knowledge for basic research on gestures, (3) the usage of avatars to manipulate real social interactions in the *transformed social interaction* approach.

Within the first approach, the movements of humans (that have either been coded by means of the Bernese System or recorded by motion capture devices) are transferred to computer animated virtual figures (Bente, Krämer, Petersen, & de Ruiter, 2001; Bente, Petersen, Krämer, & de Ruiter, 2001). The transcript can then be systematically varied with regard to every aspect of posture or movement quality. Subsequently, the animated figures can be presented within in an experimental setting. The results are promising: In two studies head movement activity was manipulated by a speed-up algorithm. Results reveal a significant effect of the increased head movement activity on observers' impressions but also indicate that effects are context-dependent: Within casual interactions increased activity is rated as positive whereas actors showing increased activity within interpersonal conflicts are evaluated more negatively (Krämer, 2001). In a further study it turned out that similar changes in gesture activity - even when more pronounced - did not change observers' impression to the same degree (Krämer, Tietz, & Bente, 2003). Similarly, in order to test for the factors decisive for the perception of genuineness of smiles, Krumhuber and Kappas (2005) produced virtual smiles that differed with regard to their dynamic attributes.

On the other hand, classical approaches of computer simulation are pursued: In a top-down approach, rules of nonverbal communication are implemented and it is tested whether virtual agents in consequence show natural behavior (Cassell et al. 1994, 1999). Here, it is taken advantage of that in order to be able to produce nonverbal communication, one has to understand it, i.e. know relevant rules. Cassell et al. (1994) succeeded in implementing aspects of the gesture-speech-relationship and thus praise the methodological benefits of this approach: "The advantage of computer modelling in this domain is that it forces us to come up with predictive theories of the gesture-speech relationship" (p. 1). They conclude: "Most research on gesture has been descriptive and distributional. With the evidence available, it is time to attempt predictive theories of gesture use. ... Formal models such as ours point up gaps in knowledge, and fuzziness in theoretical explanations" (Cassell et al., 1994, p. 10). In a similar way, Pelachaud, Badler, and Steedman (1996) model the integration of speech-accompanying facial displays (e.g., eye brow movements), paralanguage and lip synchronisation. Their summary of the benefits indicates that also a combination of first and second approach is conceivable: „Our model can be expected to help further research of human communicative faculties via automatically synthesized animation. In particular, it offers to linguists and cognitive scientists a tool to analyze, manipulate, and integrate several different determinants of communication. Because our program allows the user to switch each determinant on and off, the function and the information that each of them provides can be analyzed" (p. 34).

In a third approach, Blascovich et al. (2002) propose immersive virtual environment technology (IVET) as an innovative paradigm within experimental social psychology. The employment of virtual figures within immersive environments is seen as an opportunity to increase both experimental control and mundane realism. Summarizing the benefits, they state: "investigators can take apart the very fabric of social interaction using IVET, disabling or altering the operation of its components thereby reverse engineering social interaction. With this approach, social psychologists could systematically determine the critical aspects of successful and unsuccessful social interaction, at least within specified domains and interaction tasks" (p. 47 of manuscript available in the Internet). Most of the research of the group has been conducted with avatars, that is, virtual figures that transmit the nonverbal behavior of a human interaction partner. Using so-called transformed social interaction, Bailenson, Beall, Blascovich, Loomis, and Turk (2005) demonstrated that experimentally augmented gaze leads to increased social influence (see also Bailenson & Beall, 2006; Bailenson, Beall, Loomis, Blascovich, & Turk, 2004). Moreover, experiments regarding the

factors that affect proxemic behavior have been conducted (Bailenson, Blascovich, & Loomis, 2003; Bailenson, Blascovich, Beall, & Loomis, 2001).

3.2.2 Prerequisites for employment of agents and avatars

The most important prerequisite for being able to employ virtual persons for basic research on the effects of nonverbal behavior is that they evoke similar impressions and attributions as real humans do. Especially with regard to the perception of the human observers there should be minimal or preferably no discrepancies between live and virtual stimuli. Indeed, Bente, Krämer, Petersen, and de Ruiter (2001) have shown that virtual figures are liable to the same person perception processes as videotyped humans: When the movements of the latter are transferred to virtual figures and presented without speech, person perception ratings do not differ from those of the original humans. Moreover, virtual persons who show social facial expressions such as smiling or eyebrow raising lead to an activation of the same brain regions as those triggered by human-human-interaction – whereas meaningless facial movements did not result in their activation (Schilbach, Wohlschlaeger, Krämer, Newen, Zilles, Shah, Fink, & Vogeley, 2006). While both results can merely be generalized to person perception when being in an observer role (see Patterson´s, 1994, pleading that social interaction consists of both person perception and behavior production simultaneously), other studies show that virtual figures also evoke human-like responses when an interaction between human and virtual entity takes place. An increasing number of studies gives evidence that (in part) autonomously acting *embodied conversational agents* (Cassell et al., 2000; Gratch, Rickel, André, Badler, Cassell, & Petajan, 2002; Moreno, Mayer, Spires, & Lester, 2001) evoke social effects that are similar to those induced by human-human interaction (Krämer, 2005; Krämer, in press; Krämer & Bente, submitted; Nass & Moon, 2000). Agents have been observed to increase attentiveness (Takeuchi & Naito, 1995), invite intuitive interaction (Krämer, 2005), evoke impression management and socially desirable behavior (Sproull et al., 1996; Krämer, Bente, & Piesk, 2003) and foster social facilitation, or inhibition respectively (Rickenberg & Reeves, 2000; but see also Hoyt, Blascovich, & Swinth, 2003). In this line, Bailenson et al. (2001) summerize the result of one of their studies: "Participants in our study clearly did not treat our agent as mere animation" (p. 595).

In general, it can therefore be concluded that virtual figures induce social effects as well as real people do and evoke similar feelings and experiences – regardless of whether they are observed or whether one interacts with them. Hence, they can be assumed to be important and useful tools for studying human social behavior within innovative research approaches.

3.3 Barriers to advancing scientific progress

As depicted in paragraphs 1.1 to 1.4, nonverbal communication is extremely complex and thus first and foremost its own attributes complicate research. On the other hand, adequate methods to study subtle dynamics, movement qualities, interaction patterns and effects of cues and patterns have been presented. The most important barrier to advancing scientific process thus seems to be that these methods are not employed by all groups analyzing nonverbal communication. This might in some cases be due to the fact that especially tools for the assessment and analysis of detailed temporal data are extremely laborious and complex. However, also the lack of exchange between different groups might be causative. In fact, there is nearly no exchange across interdisciplinary boundaries: Scholars from biology and psychology (mostly focussing on emotional communication), communications and – most recently added – computer science rarely compare methods and findings.

Another reason might be that the research realm is still denied approval from other areas and disciplines. Although it, in the meantime, should have become apparent that the phenomenon is very complex and requires sophisticated methods, the area suffers from the reputation stemming from pseudo-scientific literature and early simplistic assumptions that prevailed in public opinion.

4. Applications - Current gaps between science and implementation

Probably the most important application area for findings with regard to nonverbal communication is the training of nonverbal decoding and encoding skills. Especially the ability to establish rapport is of great interest for many professions as also Bernieri and Rosenthal (1991) stress: “Interpersonal coordination and synchrony may eventually explain how it is that we can “hit it off” immediately with some people and never “get it together” with others. This aspect of rapport certainly would be of concern to professions dealing with intimate personal relations. The success of psychotherapists, physicians, counsellors, and teachers all depend to some extend on the degree of rapport they can achieve in their professional interactions” (p. 429). Here, one of the reasons for the gap between science and application becomes apparent: the complex phenomenon still has not been analysed and understood sufficiently.

But also other aspects play a role: With regard to decoding abilities, first studies indicate that a training is, in principle, feasible: Feldman, Philippot, and Crustrini (1991) trained children by providing them with feedback on how they were doing while decoding

happiness, sadness, and fear from photographs. Indeed, children who had been provided with feedback, proved to be more successful (but merely with regard to the recognition of fear) than a control group. However, this does not verify the author´s claim that social competence is increased. Due to the fact that merely photos had been presented the results can hardly be generalized to, e.g., the nonconscious decoding of subtle movement quality. Furthermore, another aspect is detrimental: Given the assumptions of Patterson (1994), a realistic training situation should always comprise not only decoding but also production of behavior since in real-life encounters both processes mutually affect each other.

Similar problems arise with regard to the training of encoding aspects, i.e. production on nonverbal behavior: As already depicted above, at least with regard to emblems and other demonstrative cues, successful trainings (e.g., with regard to cross-cultural communication) have been conducted. Here, aspects that can be learnt and produced consciously ("do not back away when the Arabic interlocutor stands nearer than you would choose him to") are considered but every behavior that might not be produced consciously is excluded from the training.

Requirements for a training taking the specific qualities of nonverbal communication into account thus are:

- Realistic setting that requires both decoding and encoding
- Immediate feedback (preferably by nonverbal rewarding and coercive signals by the training partner)
- Feedback has not only to be given with regard to demonstrative cues but also with regard to the appropriateness of subtle aspects such as movement quality

A promising possibility to achieve this might be the utilization of virtual environments and virtual training partners (for similar suggestions see Isbister, 2004). Here, different interaction settings can be provided, the trainee´s movements can analyzed with regard to their appropriateness and immediate feedback might be provided by subtle reactions of the virtual interaction partner. Thus, success or failure would not be explained and learnt consciously but trained more subtly. As described above, at least the prerequisite that human interlocutors evoke similar reactions as real humans do is given.

First developments into this direction are presented in the *mission rehearsal exercise* (Swartout et al., 2001; Rickel, Marsella, Gratch, Hill, Traum & Swartout, 2002) and other

applications (Beal, Johnson, Rabrowski, & Wu, 2005). Especially with regard to the training of subtle aspects of nonverbal behavior, though, there is still a long way to go.

Also, future applications with virtual agents might be useful in overcoming the pitfalls of, e.g., cross-cultural communication in a more direct sense. Once more detailed knowledge on the effects of behavior patterns in different cultures is available, agents might serve as digital mediators and translators of nonverbal cues within net-based interactions (see the similar approach of Isbister, Nakanishi, Ishida, & Nass, 2000) – transmitting the sender´s nonverbal behavior in a version that is more appropriate for the perceiver´s cultural background. While this scenario is already feasible for translation of verbal aspects (see Narayanan et al., 2003), research on the implementation of culture specific behavior of agents is merely beginning (Traum et al., 2005).

Another field of application for findings on nonverbal communication are embodied conversational agents for human-computer-interaction or pedagogical agents (Cassell et al., 2000; Moreno, Mayer, Spires, & Lester, 2001). Here, the implementation of adequate nonverbal behavior might contribute to facilitating human-computer-interaction. Especially pedagogical agents are expected to raise the learner´s motivation due to the use of nonverbal behavior (Lester et al., 2000; Rickel & Johnson, 2000).

Although Moreno (2001; Moreno, Mayer, Spires, & Lester, 2001) – at least with regard to specific applications - shows that the voice might be more important than nonverbal cues (see also Craig, Gholson, & Driscoll, 2002), nonverbal cues can still be assumed to be largely influential (Krämer, in press). Thus, the advances in the area of nonverbal communication might directly serve the advancement of efficient human-computer-interfaces. And moreover, embodied agents can in themselves be a valuable research tool to gain results with regard to basic research on nonverbal communication (see paragraph 3.2.1).

In order to be able to eventually realize the applications depicted above, more basic research on the structure and effects of nonverbal communication in specific settings has to be conducted. Below, several examples for major research questions are given that are feasible to study by means of the methods depicted in paragraph 3:

- Are there cultural differences with regard to subtle dynamics and movement quality?
- What exactly happens in cross-cultural communication? Is behavior automatically varied or adapted on any level (e.g. with regard to movement quality?)

- What exactly constitutes expressiveness (given that it is an important aspect of efficient communication and supports relationship-oriented leadership)? By which means can it be trained?
- Is expressive behavior evaluated positively across cultures?
- What nonverbal behavior patterns are most efficient within different leadership situations (especially with regard to task-oriented leadership which is underresearched compared to relationship-oriented leadership)?

5. Conclusion

Recent research has demonstrated that nonverbal communication is a complex phenomenon that is characterized by context dependency, the importance of movement quality and subtle dynamics as well as automaticity, i.e. a production and perception largely outside awareness. However, most research on factors influencing nonverbal communication (i.e., influence of culture, social situation, leadership setting) has not yet taken these aspects into account but focused on superficial aspects and single cues. Moreover, the different research domains have not been sufficiently connected, thus leaving the question unsolved if the effects of specific cues and patterns identified in western culture will also be found in other cultures. Given that appropriate methods for analysing both the structure of communication (via time series notation and analysis) and the effects of cues and movement qualities (via computer animated figures such as agents and avatars) are available, further advancements can be expected. Most important prerequisite for efficient research will be, however, to pool the expertise of different disciplines – especially with regard to potential synergies concerning innovative methods.

6. References

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