Nonverbal Communication in Intergenerational Interactions

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Abstract

Communication is an essential part of everyday life. As Western society is growing older, communication between the young and old generations is especially of great interest. This dissertation aims to unravel intergenerational communication by studying interpersonal behavioral coordination in real-life interactions between young and older adults. Interpersonal coordination is considered to have a positive influence in terms of smoothness and mutual liking on interactions. Thus, this dissertation sets out to determine whether interpersonal coordination depends on contextual factors such as the social relation context but also the affective context. The present work uses a multi-faceted approach, in which emotional and behavioral mimicry as well as synchrony are considered to be three aspects of interpersonal coordination. Several studies were conducted to assess emotional mimicry (Study 1), synchrony and behavioral mimicry (Study 2). Moreover, as it was hypothesized that young adults are not motivated to affiliate with the elderly, a heightened affiliation motivation toward the elderly was experimentally created and emotional mimicry assessed subsequently (Study 3). For studies 1 and 2, young adults were invited to interact with an elderly person or with a person of the same age who recounted an emotional (happy or angry) event. Findings of Study 1 revealed that happiness expressions were mimicked, particularly within same-generation interactions and during the narration of a happy event, while angry expressions were rarely displayed and not mimicked. Findings of Study 2 revealed more synchrony within same-generation compared to intergenerational interactions, whereas there was more behavioral mimicry of elderly interaction partners compared to young interaction partners. Moreover, findings of Study 3 illustrated that it is possible to create a heightened motivation toward an older person which in turn positively influenced mimicking behavior toward the whole age group. This dissertation provides a first step in unravelling real-life intergenerational interactions, with findings regarding emotional mimicry and synchrony to suggest that although young individuals may be motivated to have a successful interaction with the elderly, certain circumstances might prevent them from acting the same toward young and old interaction partners. However, as we were able to successfully manipulate affiliation motivation, a promising positive outlook for intergenerational communication emerged, which is of great importance especially now as old age becoming an undeniable part of everyday life.

Zusammenfassung

Kommunikation ist ein wesentlicher Aspekt unseres täglichen Lebens. Da die heutige westliche Gesellschaft immer älter wird, ist insbesondere die Kommunikation zwischen jungen und alten Menschen von großem Interesse. Die vorliegende Arbeit zielt darauf ab, Einblicke in die Kommunikation intergenerationaler Interkationen zu erhalten, indem die interpersonale Koordination in realen Interaktionen zwischen jungen und älteren Erwachsenen betrachtet wird. Interpersonale Koordination gilt als positiver Faktor in einer Interaktion, da diese eine positive Wirkung auf die Reibungslosigkeit und Sympathie zweier Personen ausübt. Deshalb ist auch interpersonale Koordination zwischen zwei Menschen der Fokus dieser Arbeit, wobei insbesondere die Abhängigkeit interpersonaler Koordination von bestimmten Kontextfaktoren wie der sozial-relationale Kontext, als auch der affektive Kontext studiert wird. Die vorliegende Arbeit beruht auf einem multi-facetten Ansatz, der die emotionale und behaviorale Mimikry, als auch die Synchronität zweier Interaktionspartner als drei Aspekte interpersonaler Koordination versteht. Hierfür wurden mehrere Studien zur Analyse von emotionaler Mimikry (Studie 1), Synchronität und behavioraler Mimikry (Studie 2) durchgeführt. Außerdem wurde nach der Vermutung, dass junge Erwachsene nicht motiviert sind mit älteren Menschen eine nähere Bindung einzugehen, eine Zugehörigkeitsmotivation gegenüber Älteren experimentell erzeugt und anschließend emotionale Mimikry erhoben (Studie 3). Für Studien 1 und 2 interagierten junge Probanden mit einer älteren Person oder mit einer Person gleichen Alters, die ein emotionales (freudiges oder ärgerliches) Ereignis wiedergab. Studie 1 zeigte, dass freudige Gesichtsausdrücke immer imitiert wurden, insbesondere innerhalb gleichaltriger Interaktionen und während der Erzählung eines freudigen Ereignisses. Dagegen wurden ärgerliche Ausdrücke nur selten gezeigt und auch nicht nachgeahmt. Studie 2 zeigte mehr Synchronität innerhalb gleichaltriger Interaktionen als bei nicht-gleichaltrigen, während mehr behaviorale Mimikry bei älteren Interaktionspartnern als bei jungen Interaktionspartnern gefunden wurde. Darüber hinaus veranschaulichten die Ergebnisse der Studie 3, dass eine erhöhte Zugehörigkeitsmotivation gegenüber einer älteren Person experimentell herbeigeführt werden konnte, die wiederum das Imitiationsverhalten gegenüber der gesamten Altersgruppe positiv beeinflusste. Die vorliegende Arbeit verschafft einen ersten wissenschaftlichen Einblick in intergenerationale Interaktionen, deren Ergebnisse bezüglich emotionaler Mimikry und Synchronität nahelegen, dass obwohl junge Menschen generell motiviert sind mit älteren Menschen zu interagieren, bestimmte Umstände sie davon abhalten können. Allerdings konnten wir mit der erfolgreichen Manipulation der Zugehörigkeitsmotivation einen vielversprechenden und bedeutsamen Ausblick für intergenerationale Kommunikation schaffen, da das Altern ein unleugbarer Teil des täglichen Lebens ist.

Introduction

Today's society is changing; it is becoming older and by 2050, the proportional world's population of adults of 60 years and older will increase to 22 percent ("WHO | Facts about ageing," n.d.). As the proportion of the elderly is growing, so is our communication with the elderly. Communication is the means by which the doctor talks to the patient, the bank teller to the costumer, or the grandparent to the child. The verbal and nonverbal communicative acts form, strengthen and dissolve social relationships (Nussbaum & Coupland, 2004) and are therefore of great importance in our everyday life. While communicating with others, we are coordinating our behavior, which is in fact the exchange of information about warmth, similarity and empathy (Jaffe et al., 2001). This provides an impression about the quality of the interaction, where an increase of coordination in communication signals an increase of warmth and empathy between interaction partners. Hence, it is essential to study communication between young and old individuals to obtain an overview of intergenerational relationships to highlight, and in turn, reduce any possible communication problems between the different generations. The best way to do just that is the study of real-life interactions with young and older individuals interacting over a certain period of time.

The present work proposes a multi-faceted approach to the study of intergenerational interactions, in which interpersonal coordination, subsuming emotional and behavioral mimicry as well as synchrony, is used to describe interaction quality.

In the course of this dissertation, the term interpersonal coordination and its role in human communication will be introduced. Deriving from previous research on empathy, in particular emotion communication and the elderly, a main research question is formed: How do contextual factors such as the social relational context and the affective context influence interpersonal coordination in intergenerational interactions? Several empirical studies concentrating on this question are described and summarized in three manuscripts. Lastly, findings are discussed within their current literature and future research ideas, and implications are deduced.

Behavioral Coordination in a Social World

"Man is by nature a social animal." This quote by Aristotle perfectly summarizes the core of human life. We spend most of our waking life in a social environment, in which we coordinate our actions with the actions of those around us, use other people's feedback to understand ourselves and to fit into the social world we live in (Lieberman, 2007). Humans have the fundamental need to belong and to feel connected to both, people we are close to and

strangers (see Baumeister & Leary, 1995). This need is accompanied by the motivation to have smooth, conflict-free interactions with others and the desire to build strong, steady interpersonal relationships (Chartrand & Bargh, 1999). Coordination or adaptation of behavior serves this basic need to belong, thus humans have the strong tendency to coordinate their behavior within social interactions. When interaction partners coordinate or sync their behavior during their interaction, they are in fact exchanging information regarding perceived warmth, similarity and empathy (Jaffe et al., 2001). This in turn facilitates social interactions and strengthens interpersonal bonding and connectedness. Interaction partners are usually unaware of this nonverbal coordination as it appears to occur effortlessly in many interactions (Chartrand & Lakin, 2013).

While we perform most of our actions in a social environment, we coordinate our behavior with others around us. Accordingly, our actions are best understood as an interpersonal aspect (Schmidt, Fitzpatrick, Caron, & Mergeche, 2011), thus I will use the term *interpersonal coordination* throughout this dissertation.

Interpersonal Coordination in Social Interactions

As mentioned earlier, interpersonal coordination is in fact an information exchange regarding perceived warmth, similarity and empathy (Jaffe et al., 2001). Particularly empathy has gained a lot of attention in psychological research in recent years for its fundamental role in social interactions and its importance regarding moral development (e.g., Eisenberg, 2000), and pro-social behavior, and altruistic behavior (e.g., Eisenberg & Miller, 1987).

Empathy is a complex field of study, which entails several psychological concepts and it is variously defined in different psychological disciplines, which makes it difficult to find a universal definition (see Batson, 2011, for an overview). However, it is broadly agreed that empathy can involve *cognitive* and *affective* processes (e.g., Eisenberg & Miller, 1987; Richter & Kunzmann, 2011). The cognitive process entails the cognitive understanding of another person's internal state (e.g., Decety & Jackson, 2004; Eslinger, 1998), which is also labeled empathic accuracy; the ability to correctly infer another person's feelings (Ickes, 1993). In contrast, affective empathy describes the degree to which one shares the feelings of another person (Eisenberg & Fabes, 1990). Here, empathy includes emotional congruence or emotion match (e.g., Eisenberg & Fabes, 1990; Eisenberg & Miller, 1987) as well as *emotional* mimicry; the imitation of emotional expressions (Hess & Fischer, 2013, 2014).

On the other hand, empathy can also entail *behavioral* matching or mimicking of an observed other. In fact, Allport (as cited in Bavelas, Black, Lemery, & Mullett, 1990) used the

term empathy in reference to "objective motor mimicry", thus one could state that motor mimicry is the prototype of empathy, which would only later become so complex (Batson, 2011). Hence, empathy can involve the coordination of gross motor movements, as well as the coordination of more specific movements, such as emotional facial expressions. However, empathy and interpersonal coordination of behaviors should be distinguished. For example, previous literature stated that coordination of movements, especially emotional mimicry requires empathy, or the motivation to interact empathically with another person, empathy is a more broadly defined concept, which does not necessarily need (emotional) mimicry (Hess & Fischer, 2014). Moreover, in contrast to emotional mimicry, I believe that behavioral mimicry and synchrony, which are considered to be aspects of interpersonal coordination (Hove & Risen, 2009), do not necessarily need empathy since they do not always carry emotional information as facial expressions do (Hess & Fischer, 2014).

In conclusion, we spend the majority of our lives in social surroundings, trying to coordinate our movements with others. Therefore, I am using *interpersonal coordination* as the overarching concept of this work, as it entails emotional and behavioral mimicry as well as synchrony. In the following, I will define empathy as one part of interpersonal coordination, which *can*, but must not, entail empathy.

Mimicry as a Part of Interpersonal Coordination

Mimicry is the tendency to imitate vocal, facial, and postural expressions of others (Hess, Philippot, & Blairy, 1999). It signals social understanding, belonging, and acceptance (Hess & Fischer, 2013). Mimicry helps to feel closer and connected by creating an affiliative link between interaction partners (Hess & Fischer, 2014), which in turn can increase the perception of similarity and liking (Hess, Philippot, & Blairy, 1999; van der Schalk et al., 2011; Yabar & Hess, 2007). Mimicry can be found whilst interacting with others (e.g., Fischer, Becker, & Veenstra, 2012; Hess & Bourgeois, 2010), or toward persons depicted in photos (e.g., Dimberg, Thunberg, & Elmehed, 2000) and videos (e.g., Hess & Blairy, 2001; Hühnel, Fölster, Werheid, & Hess, 2014; van der Schalk et al., 2011).

Recent literature distinguishes two kinds of mimicry (Hess & Fischer, 2013, 2014): *emotional* mimicry, which entails the imitation of emotional facial expressions of others; and *behavioral* mimicry, the imitation of mostly non-emotional behavioral movements or postures such as foot shaking or face touching (see Chartrand & Lakin, 2013, for an overview).

Emotional Mimicry

Emotional mimicry is defined as matching nonverbal facial behavior including the imitation of emotional expressions (Hess & Fischer, 2014). Expresser's and observer's facial expressions occur shortly after each other; within 800 (+/-200) milliseconds (Dimberg & Thunberg, 1998; Sato & Yoshikawa, 2007).

Typically, emotional mimicry in terms of facial muscle movements is measured with electrodes attached to the faces of expresser and observer (EMG: Electromyography; for example, Hess & Blairy, 2001; Hess & Bourgeois, 2010; Hühnel, Fölster, Werheid, & Hess, 2014; van der Schalk et al., 2011) but also by coding facial muscle movements according to the Facial Action Coding System (Ekman & Friesen, 1976), by trained coders (e.g., Sato & Yoshikawa, 2007), or by a fully automatic computer program such as the Computer Expression Recognition Toolbox (CERT; Littlewort et al., 2011).

Behavioral Mimicry

Behavioral mimicry is defined as a matching of nonverbal behavior (e.g., Chartrand & Lakin, 2013; Hove & Risen, 2009) which includes the imitation of postures, gestures and mannerisms (Yabar, Johnston, Miles, & Peace, 2006). It entails a particular behavior that is unconsciously repeated or imitated by an interaction partner within a certain window of time (Chartrand & Bargh, 1999; Chartrand & Lakin, 2013; Lakin & Chartrand, 2003). Behavioral mimicry is measured by coding certain behaviors. Typically, a behavior is scored as mimicry when the behavior of the observer matched the behavior of the expresser and occurred within a time frame of up to 10 seconds (Stel, van Baaren, & Vonk, 2008; Stel & Vonk, 2010).

Synchrony as a Part of Interpersonal Coordination

However, not just mimicry, but also synchrony is considered to be a part of interpersonal coordination and thus has a positive impact on social interactions. Synchrony produces feelings of connectedness and rapport (Bernieri, Reznick, & Rosenthal, 1988; Hove & Risen, 2009; Wiltermuth & Heath, 2009), because it generates a feeling of "oneness" that connects people and it can be found during military drills or among sports teams and fans, where rhythms such as clapping or marching are common (McNeill, 1995; Vacharkulksemsuk & Fredrickson, 2012). Thus, it is typically defined as a matching of behavior as well as coordination of movement between individuals in form and in a temporally organized fashion during interpersonal communication (Bernieri et al., 1988; Miles, Griffiths, Richardson, & Macrae, 2010; Valdesolo & DeSteno, 2011).

Temporal alignment is crucial for synchrony; it entails the anticipation of the interaction partner's behavior to coordinate the timing of movement, i.e. to be in sync with the other person (Chartrand & Lakin, 2013; Sebanz, Bekkering, & Knoblich, 2006). Moreover, synchrony is characterized by a global assessment of movement and postures. Bernieri et al. (Bernieri, Davis, Rosenthal, & Knee, 1994; Bernieri et al., 1988) employed a coding procedure based on the idea that human observers are able to perceive *Gestalt* (overall) qualities of synchrony (Vacharkulksemsuk & Fredrickson, 2012) and that it does not base on any particular behavior (Ramseyer & Tschacher, 2011).

Emotional mimicry, behavioral mimicry, and synchrony can be considered as three distinct features of interpersonal coordination, which have distinct definitions and assessment methods. All of them still have the common underlying factor of a positive impact on social interaction. However, as coordination always takes place within a social environment, our coordination behavior can be influenced or even restricted because of certain contextual factors, such as the social relation context and the affective context within which we coordinate our movements.

Interpersonal Coordination and the Social Relational Context

Interpersonal coordination serves a social function, the degree to which people successfully coordinate their behaviors correspond with an individual's rapport, liking or connectedness (e.g., Bernieri et al., 1988; Chartrand & Bargh, 1999; Hess & Fischer, 2014; Marsh, Richardson, & Schmidt, 2009). Numerous contextual factors such as characteristics of the observer, the emotional valence of a situation, and also the relationship between observer and expresser can moderate the extent of coordination within a social interaction (Chartrand & Lakin, 2013; Yabar et al., 2006).

For instance, individuals coordinate their movements with those people they like rather than with those toward whom they hold negative feelings (Chartrand & Bargh, 1999; Miles et al., 2010; Stel et al., 2010; Yabar et al., 2006). Typically, people tend to like and thus have a higher motivation to affiliate with those who are members of the same social group than members of an out-group (Bourgeois & Hess, 2008; Lakin & Chartrand, 2003; Lakin, Chartrand, & Arkin, 2008; Yabar et al., 2006). Regarding interpersonal coordination, previous research has shown that emotional facial mimicry (e.g., Bourgeois & Hess, 2008; Yabar & Hess, 2007), behavioral mimicry (Lakin et al., 2008; Yabar et al., 2006), and also synchrony (e.g., Miles, Lumsden, Richardson, & Macrae, 2011) vary as a function of the social relational context, e.g. group membership.

Interpersonal Coordination and the Affective Context

The affective context can also influence interpersonal coordination. In past research, emotional mimicry is considered a matched-motor response in terms of an automatic imitation of nonverbal displays, such as discrete facial muscle movements (Chartrand & Bargh, 1999; Lakin, Jefferis, Cheng, & Chartrand, 2003). This means that a congruent facial reaction toward an emotion shown by others, i.e. smiling toward a smiling face or frowning toward an angry face, can be considered an automatic matched-motor response. However, according to Hess and Fischer (2013, 2014) this view does not hold particularly for emotional mimicry. It is assumed that emotions are typically not neutral and carry a certain message, such as to approach or withdraw (Hess & Fischer, 2013, 2014). Thus, it has been argued that people only mimic a displayed emotion, when the emotional signal can be perceived as affiliative in some form, such as smiling (e.g., Bourgeois & Hess, 2008; Hess & Fischer, 2013, 2014), which then promotes social bonding and connectedness. In contrast, antagonistic emotions such as anger or (interpersonal) disgust do not promote signs of empathy and understanding (Fischer et al., 2012; Hess & Bourgeois, 2010) and thus are believed to be not mimicked in a social context. In this context, emotional facial expressions do not just signal an emotion, but they intrinsically indicate an affiliative intent (Bourgeois & Hess, 2008). Taken together, emotional mimicry is not just an automatic process, it is rather dependable on the affective context, such as the type of the expressed emotion (Fischer et al., 2012). However, the emotional valence of a situation can also have an impact on interpersonal coordination regarding emotional mimicry, as well as behavioral mimicry and synchrony. For example, a person's current emotional state has been found to affect emotional facial mimicry (Likowski et al., 2011), behavioral mimicry (van Baaren, Fockenberg, Holland, Janssen, & van Knippenberg, 2006), and synchrony (Miles et al., 2010).

Interpersonal Coordination and the Elderly

As discussed in the previous sections, interpersonal coordination can vary as a function of the affective context and the social relational context, i.e the group membership, where mostly members of the own group are shown to be more mimicked than members of the out-group (e.g., Bourgeois & Hess, 2008; Hess & Bourgeois, 2010; Lakin et al., 2008).

Group membership is commonly based on main dimensions people use to categorize others, such as ethnicity (Bourgeois & Hess, 2008), gender (Hess & Bourgeois, 2010; Lakin et al., 2008), but also age is an important part of social categorization (Bousfield, 2010; Nelson, 2005). Thus, elderly individuals (65 years and older) belong to another social group

(i.e. out-group) than young individuals (Cuddy, Norton, & Fiske, 2005). In fact, as Western society is growing older ("WHO | Ageing," n.d.), interactions and communication between young and old people increase. Associated with that differences between younger and older generations derive such as their own values or predispositions, which then can exacerbate (Barker, Giles, & Harwood, 2004) and reduce interpersonal coordination and empathy in intergenerational communication. Consequently, if empathy in an interaction is reduced, understanding and perception of the interaction partner's inner state and intentions are reduced as well (Hareli & Hess, 2010).

Research Gaps on the Elderly and Interpersonal Coordination

So far, research mainly focused on empathy toward the elderly, but not on interpersonal coordination as a more general concept. However, the ageing perspective on empathy was neglected for a long time beforehand (cf. Richter & Kunzmann, 2011). This comes as a surprise, given that ageism is an irrefutable part of our society. Nelson (2005), speaking about the U.S., summarized: "age prejudice in this country is one of the most socially-condoned and institutionalized forms of prejudice" (p. 208). As the elderly constitute a great part of our society today and empathy serves an adaptive function in the social world, it is just a logical consequence to study empathy, interpersonal coordination and the elderly.

Fortunately, research on empathy and interpersonal coordination has evolved, as a few more recent publications investigated the topic of empathy as well as interpersonal coordination in terms of emotional mimicry and old age (e.g., Hess, Adams Jr., Simard, Stevenson, & Kleck, 2012; Hühnel et al., 2014; Richter & Kunzmann, 2011). In particular, several studies focused on affective and cognitive empathy operationalized through emotional facial mimicry and decoding of emotions, respectively. Findings of cognitive empathy in terms of the accurate decoding of emotional facial expressions suggest reduced cognitive empathy of young adults, as younger individuals had difficulties to accurately decode emotional displays of older people depicted in still photos and video clips (Hess et al., 2012; Hühnel et al., 2014; Hühnel & Hess, 2014). One would assume that these decoding difficulties could lead to a reduction of affective empathy, as the correct identification of emotion poses a prerequisite of emotional facial mimicry. However, results so far showed the opposite, as both young and old age groups showed emotional mimicry for facial expressions displayed by young and old actors (Hühnel et al., 2014). Thus, group membership and the affective context had an effect on cognitive empathy, but not on affective empathy.

Although research regarding empathy and old age is not a novelty anymore, there are still too few studies, which show confusing rather than clarifying results. Moreover, these findings

only addressed cognitive and affective empathy in terms of emotion decoding and emotional mimicry, whereas, to my knowledge, interpersonal coordination aspects such as behavioral mimicry as well as synchrony had not been subjects of the study of intergenerational interactions. Hence, a more multi-faceted approach including a behavioral and non-emotional facet can be an important addition on the way to unravel intergenerational communication.

Lastly, it is still not clear, what the underlying mechanisms of interpersonal coordination and empathy are. Fölster et al. (2014) named various underlying mechanisms seeming to affect decoding accuracy, such as age-related changes in the elderly's faces, attitudes toward older adults or age differences in expressivity. In the following, I will shortly discuss the effect of actor age, as it was subject of previous publications, and then focus on another aspect worth mentioning as it may pose an additional underlying factor of empathy: the young adults' experience of social distance toward a person of old age.

Underlying Factors of Interpersonal Coordination

Age of Actor

Fact is, previous research found that young adults have difficulties to correctly identify emotions shown in the faces of elderly (Hess et al., 2012; Riediger, Voelkle, Ebner, & Lindenberger, 2011). Hess et al. (2012) suggested that young adults' difficulties are based on age-related changes in an older adult's face. This can be explained by the wrinkles, folds and coloration of skin in an older face (Burt & Perrett, 1995), which can reduce the signal clarity of an emotion expression when inspecting faces (Ebner, He, & Johnson, 2011). Thus, difficulties in emotion recognition can negatively influence intergenerational interactions, since young adults have a restricted ability to empathize. However, young people's decoding difficulties of emotions shown by the elderly can only partly explain the impediments within intergenerational interactions as they solely take emotions into account. As mentioned before, behavioral aspects such as behavioral mimicry and synchrony, which are believed to be mainly non-emotional, do also influence the quality of an interaction by creating connectedness and liking (e.g., Miles et al., 2010; Stel & Vonk, 2010). Here, difficulties of emotion identification cannot be the sole explanation as authors have argued that behavioral mimicry is mainly non-emotional (Hess & Fischer, 2013, 2014). Thus, another aspect needs to be found, which can also restrict or facilitate empathy.

Social Distance and Affiliation Motivation

So far, the experience of social distance as an underlying factor of empathy and the elderly has not been considered before in previous research. However, one should consider

that a decreased ability of younger people to decode the facial expressions of the elderly might also be partially explained by a social distance toward the elderly, which in turn can negatively influence the motivation of younger adults to affiliate with the elderly. In fact, Miles and colleagues (2011) suggested that interpersonal coordination in terms of synchronous movements may act as a bridge to reduce intergroup difference and social distance. Thus, one could argue that a lack of closeness (i.e. social distance) toward and out-group member also reduces the motivation to affiliate with that person. Hence, reduced affiliation motivation could in turn negatively influence empathic reactions toward the elderly, such as mimicry and the recognition of emotion. Indeed, previous research has shown that people mimic emotional facial expressions depending on their affiliation motivation toward the interaction partners (cf. Hess & Fischer, 2013). People are in general more inclined to mimic those they like (McIntosh, 2006) or with whom they expect to cooperate rather than compete (Lanzetta & Englis, 1989; Weyers, Mühlberger, Kund, Hess, & Pauli, 2009) and as stated before, these are usually people from the social in-group rather than people from an out-group (Bourgeois & Hess, 2008; Lakin et al., 2008; Yabar et al., 2006).

In sum, social distance and the associated reduced motivation to affiliate can impede interpersonal coordination between the young and the elderly. Moreover, young peoples' difficulties of decoding emotions shown by the elderly can reduce emotional facial mimicry and thus impede an effective intergenerational interaction.

Sociability of Experimental Studies

Research on emotional mimicry as well as emotion decoding is typically based on still photos in which emotions are presented as static expressions displayed by previously instructed actors. However, these tasks lack external validity. The stimuli only provide little contextual information, but as extensively stated in my previous sections, it is necessary to take the context into account. For example, as for emotional mimicry, in order to determine whether a congruent facial reaction such as a frown occurs in response to observing that frown shown by the interaction partner or in response to another factor (e.g. concentration). This may explain why antagonistic emotions have been found to be mimicked when they were presented as photos and videos (see Hess & Fischer, 2013), whereas mimicry of antagonistic facial expressions was reduced or even eliminated in real-life situations (Fischer et al., 2012; Hess & Bourgeois, 2010). Moreover, the to-be-recognized emotions are posed rather than really experienced, which in turn could also impede emotion recognition.

Taken together, a participant's emotion decoding or mimicry performance can only be a rough proxy of this participant's empathic responses in a more natural environment. Thus,

assessments of participants' behaviors should occur in a more social environment, from video clips, in which expressers talk about emotional events and show the appropriate emotions, to real-life interactions, where expresser and observer display and react to shown emotions and behaviors. As such, social context becomes salient and thus can moderate interpersonal coordination in terms of emotional (Fischer et al., 2012) and behavioral mimicry, as well as synchrony.

Research Questions

In summary, interpersonal coordination and empathy are crucial parts of social interactions. When interpersonal coordination is reduced, it has negative consequences on the interactions, which in turn influences communication. Two factors were named that can influence coordination in a social environment: the affective context (the affiliative signal expressions and the affective valence of the situation) and the social relational context (the relationship between observer and expresser), which in turn is closely related to the motivation to affiliate. To put it differently, people might be less motivated with individuals they do not have a close relationship with. These individuals can be members of another group, an out-group. People are commonly categorized to an out-groups based on race, gender, but also age (Nelson, 2005). So far, little research has been done on old age and interpersonal coordination. As outlined in previous sections, existing research on old age focused especially on affective and cognitive empathy in terms of emotional mimicry and emotion decoding, respectively.

However, as interpersonal coordination is such a multi-faceted construct, the first aim of this dissertation was to go a step further and empirically examine not just the emotional but also more generally the *social* communication of young and old individuals in terms of emotional *and* behavioral mimicry as well as synchrony within face-to-face interactions. Real-life, face-to-face intergenerational interactions pose a highly sociable method of assessment, which can provide more insight into the interpersonal coordination beyond the scope of already existing findings regarding emotional mimicry as these are based on still photos (Hühnel & Hess, 2014) or dynamic expressions depicted in video clips (Hühnel et al., 2014). The second aim of this dissertation was the creation of an affiliation motivation toward the elderly in order to unravel the underlying mechanisms of interpersonal coordination.

This dissertation represents a multi-faceted approach of interpersonal coordination and the elderly. Basis of the research are young individuals ranging from ages 18 to 31 and old individuals, ranging from ages 65 to 86. Four overarching questions guided my work:

1) How do certain contextual factors such as the social relational context (group membership) and the affective context (emotional signal of facial expressions and affective valence of situation) influence interpersonal coordination in terms of
    a. *Emotional mimicry,*
    b. *Behavioral mimicry*, and
    c. *Synchrony* in face-to-face intergenerational interactions?
2) Can the social relational context help to empirically discern synchrony and behavioral mimicry, as these terms are often used interchangeably?
3) In which ways does the creation of an affiliation motivation toward an older person influence younger adults' behavioral coordination with older adults?
4) How does the sociability of the stimulus material (dynamic expressions, real-life interactions) influence interpersonal coordination of younger and older adults?

Figure 1 illustrates the first and main research question, which focuses on the effect of the social relational and the affective context on interpersonal coordination in terms of synchrony, behavioral mimicry and emotional mimicry in interactions between young and elderly interaction partners.

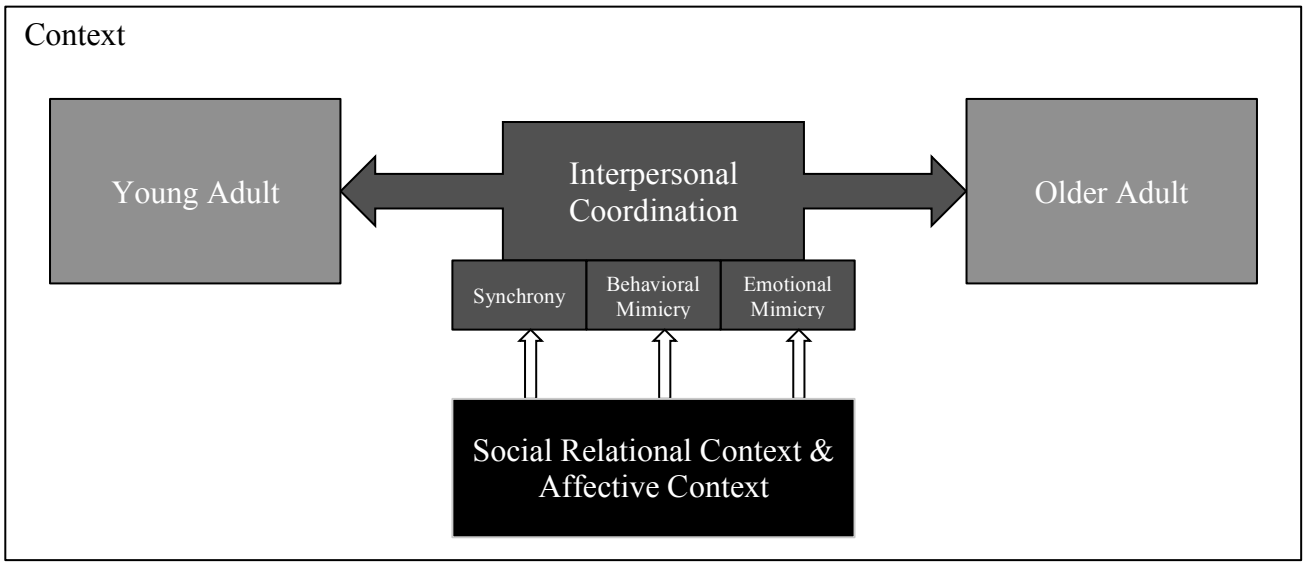

Figure 1. Illustration of contextual factors (social relational and affective context) influencing interpersonal coordination (synchrony, behavioral and emotional mimicry) within intergenerational interactions

Overview of Studies

All studies were conducted as a part of the research project "Empathic reactions to the emotional facial expressions of the elderly" funded by the German Research Foundation

(DFG). Data were collected and analyzed in collaboration with my co-authors at Humboldt-Universität zu Berlin from 2012 to 2014. Studies described in Manuscripts 1 and 2 are based on real-life *intergenerational* interactions, which consisted of a younger and an older interaction partner, and *same-generation* interactions, which consisted of young same-age interaction partners. In these studies, interpersonal coordination in terms of emotional and behavioral mimicry as well as synchrony were assessed within intergenerational and same-generation interactions. Manuscript 3 describes the creation of an affiliation motivation toward an older person and its influence on young adults' subsequent empathic behavior such as emotional facial mimicry and emotion recognition toward dynamic expressions of younger and older actors depicted in video clips. Table 1 gives an overview of the specific studies.

Table 1. Overview IVs, DVs and experimental setting in three studies

	Independent Variables	**Dependent Variables**	**Sociability of Experimental Setting**
Study 1	Type of interaction & emotional narration	Emotional mimicry operationalized through automatic coding of facial mimicry	Laboratory assessment based on real-life interactions
Study 2	Type of interaction & emotional narration	Behavioral mimicry and synchrony operationalized through behavior coding and synchrony rating	Laboratory assessment based on real-life interactions
Study 3	Type of interaction & emotional narration	Emotional mimicry operationalized through facial Electromyography (EMG)	Laboratory assessment based on video clips

Manuscript 1: Emotional Mimicry of Facial Expressions in Real-Life Intergenerational Interactions

In our first study we extended previous research on emotional facial mimicry operationalized through photos and dynamic expression (Hühnel et al., 2014; Hühnel & Hess, 2014) by assessing emotional mimicry of interaction partners within the highly sociable environment of real-life face-to-face interactions. We followed the notion that emotional mimicry is dependent on the social relational context in terms of group membership and the affective context in terms of the emotional signal. Thus, we argued that antagonistic facial expressions do not signal empathy and thus are not mimicked within a real-life interaction. Moreover, mimicry of positive facial expressions, which signals empathy, should differ as to whether it is shown by a member of the own age group or a member of the old age group. Therefore, antagonistic and positive emotions, namely anger and happiness were evoked within same-generation dyads, in which young participants (age 20 - 31 years) were invited to interact with a confederate of the same age (aged 20-25 years), or intergenerational dyads, in

which they interacted with an elderly confederate (aged 72 - 86 years). All confederates were instructed to pretend to be a fellow participant and to narrate either a happy or angry event that supposedly happened to them. Angry and happy displays of expresser and observer were recorded and automatically coded using the Computer Expression Recognition Toolbox (CERT).

Findings revealed that happiness expressions were always expressed and mimicked. In contrast, anger expressions were rarely displayed and not mimicked within face-to-face-interactions. Given that anger was rarely displayed and the overall level of mimicry was much lower regarding anger expressions, we could not draw appropriate conclusions regarding the mimicry of anger expressions within intergenerational dyads compared to same-generation dyads. However, we did find differences for happiness expressions, as mimicry of smiles was reduced within intergenerational dyads compared to same-generation dyads particularly during the happiness narration. Since smiling has low social costs, members of another age group are mimicked, but not to the same extent. This implies that young people are willing to be cooperative and try to build up smooth interactions with elderly people, but not as much as with their peers.

Interestingly, this pattern changed when the situation was more negatively valenced: We found that the expressions of happiness were similarly mimicked within same-generation and intergenerational dyads during the narration of an angry event. A negatively valenced situation might enhance the empathy or even sympathy for the elderly, which then leads to a greater effort of mimicking smiles.

In conclusion, we found effects of the social relational context in terms of age group membership and the affective context in terms of the emotional signal of facial expressions but also the affective valence of the situation. Research concerning emotional mimicry of in-group and out-group members in real-life interactions should consider studying mimicry of positive facial expressions, which are, in contrast to many negative facial expressions, clearly interpretable. Moreover, one should proceed with caution when generalizing findings on emotional mimicry from a low social context where the mimicked targets consist of photos or videos depicting emotional facial expressions, to a high social context where the mimicked targets are real interaction partners.

Manuscript 2: Interpersonal Coordination Between Young and Elderly Adults: Interpersonal Synchrony and Behavioral Mimicry

Manuscript 1, which focused on interpersonal coordination of nonverbal facial displays showed that the imitation of another's facial expressions did not occur automatically in all

kinds of interactions. Rather, emotional mimicry depended on the social relational context of the interaction. Additionally, we found that the affective context influenced emotional mimicry as well.

This second manuscript aims to continue the line of reasoning and outlines to what degree the other two aspects of interpersonal coordination, synchrony and behavioral mimicry, depend on the interactions' context in terms of group membership and affective valence of the situation. Additionally, we aimed to empirically discern synchrony and mimicry with the help of the social and affective context, as they are often used interchangeably.

As expected, interpersonal synchrony and behavioral mimicry depended on the groups the interaction partners belonged to. However, both aspects of interpersonal coordination held different results. Whereas findings revealed more synchrony within same-generation compared to intergenerational dyads, mimicry findings of particularly head nodding showed more mimicry of older adults compared to mimicry of adults with the same age. Moreover, interpersonal synchrony suggested an influence of the affective context, while behavioral mimicry did not.

Although these findings seem contradictory at first glance, the outcomes might be actually the same but manifest themselves in different ways. We argued that our findings unfolded the young persons' experience of distance or rather lack of closeness toward their older interaction partners, and this experience was expressed in two distinct ways.

This meant for synchrony, the experienced lack of closeness toward the elderly manifested itself as the young people's difficulties of predicting the older persons' behaviors and intentions, which then in turn impeded a successful temporal alignment in order to be able to be in sync with the other person. Interestingly, the lack of closeness revealed itself differently in behavioral mimicry. Here, our findings suggested the younger people's motivation to reduce that distance by communicating shared understanding and mutual acceptance via mimicking a specific behavioral aspect: head nodding.

To conclude, behavioral mimicry and synchrony, which make up a more behavioral and lesser emotional facet of interpersonal coordination, are also influenced by the social relational context in terms of group membership. These findings might set a discussion in motion where not just emotionality, but rather the degree of sociality of an individual's behavior is an indicator of empathic behavior. Thus, in order to completely unravel interpersonal coordination within face-to-face interactions, the social relational context should

be considered as a combination of emotional and behavioral displays as well as group membership.

Manuscript 3: Increasing Young Adults' Empathic Responding toward the Elderly: Effects on Emotional Facial Mimicry and Decoding Accuracy

As described in Manuscript 2, we believed that young adults have a heightened motivation to reduce an experienced distance toward the elderly, which manifested itself in an increase of behavioral mimicry. Thus, we wanted to test whether a deliberately induced motivation to affiliate influences interpersonal coordination in terms of emotional facial mimicry toward the elderly.

In order to manipulate an affiliation motivation, we created a modified version of a three-person ball throwing game called Cyberball. Each participant was assigned to either one of two conditions in this computerized game: partial inclusion or complete exclusion. In the partial inclusion condition, participants were excluded by a young (same age) player but included by an older player. By contrast, in the complete exclusion condition, both the younger and the older player excluded the participant from the ball throwing. The Cyberball game was part of a pilot study and a main study.

The pilot study tested the effects of partial inclusion and complete exclusion on the young participants' affiliation motivation in terms of their perception regarding closeness toward the players' age groups and the sociability of the particular young and older persons they played the Cyberball game with. The main study then tested whether the heightened affiliation motivation via the same manipulation would increase subsequent behavior in terms of decoding accuracy of emotional facial expressions of younger and older adults, as well as facial mimicry of those expressions.

The first study revealed that the manipulation had an impact on perceived closeness to and sociability of the players. Specifically, in the complete exclusion condition, participants felt closer to the group of the younger player and perceived the younger players as more sociable. In the partial inclusion condition, participants also felt closer to the younger player; however, the difference became smaller. Similarly, the difference of younger and older players' perceived sociability shown in the complete exclusion condition disappeared in the partial inclusion condition. Thus, an inclusive gesture during the Cyberball game by a member of another age group resulted in an increased positive perception of that particular other age group regarding perceived closeness and sociability of the player.

The second study found that participants in the partial inclusion condition, who were excluded by a member of their own age group and simultaneously included by a member by

the old age group, displayed facial mimicry for negative emotions only toward older adults but not younger adults. We found no such differences in the complete exclusion condition. Further, we found no differences between the conditions regarding the decoding accuracy, suggesting that both, partial inclusion and complete exclusion have similar effects of attention to social cues such as emotional expressions.

In sum, we believe that the affiliative gesture of inclusion by an older player during the Cyberball game had an impact on emotional facial mimicry to older adults in a subsequent mimicry task. As mimicry is crucial for smooth and harmonious interactions by signaling social understanding (Hess & Fischer, 2013, 2014), positive gestures by the elderly that increase affiliation motivation in young observers could provide a positive outlook for intergenerational interactions.

General Discussion

This dissertation involved a multi-faceted approach of interpersonal coordination and the elderly. Interpersonal coordination in terms of emotional and behavioral mimicry and also synchrony was assessed within real-life interactions, which consisted of young same-generation and intergenerational interaction partners. The studies revealed that certain contextual factors such as the social relational context (group membership) and the affective context (emotional signal of expression and the affective valence of the situation) effected interpersonal coordination.

Findings have shown that group membership influenced interpersonal coordination in terms of emotional mimicry, behavioral mimicry, and synchrony. There was more emotional mimicry and synchrony within same-generation interactions compared to intergenerational interactions. In contrast, findings regarding behavioral mimicry revealed more mimicry of particularly head nodding within intergenerational interactions compared to same-generation interactions, thus illustrating that behavioral mimicry can be empirically distinguished from synchrony. Moreover, the results described in Manuscript 1 have shown that happiness expressions are mimicked, whereas especially antagonistic emotions are not displayed and therefore not mimicked within real-life interactions; contrasting the results described in Manuscript 3, where antagonistic emotions displayed by facial expressions depicted in short video clips were mimicked. This demonstrates that the sociability of stimulus materials can lead to different outcomes. In the following, the main findings and possible underlying mechanisms accounting for the outcomes are discussed in more detail.

Contextual Factors

The Social Relational Context: A Lack of Closeness as the Underlying Factor

First and foremost, I argue that young participants were overall motivated to have a positive and smooth communication with their elderly interaction partners since they were instructed beforehand to have a several minutes long conversation in the studies described in Manuscripts 1 and 2. However, as the elderly belong to another group, coming from different historical backgrounds with different values and predispositions may complicate mutual understanding and communication (Barker et al., 2004). Moreover, certain aspects such as intergroup anxiety, the fear that interacting with out-group members could lead to embarrassment or misunderstanding (Stephan & Stephan, 1985) and also stereotypes about the elderly (e.g., Barker et al., 2004; Butler, 1989; Cuddy et al., 2005) can leave young participants feeling rather *distant* toward an older person and in turn influence their behavior toward the elderly. For the emotional mimicry findings described in Manuscript 1, this implies that young individuals were willing to be cooperative and try to build up smooth interactions with elderly adults by mimicking happiness expressions shown by the elderly, but they did not mimic them as much as their peers. Here, our findings suggest that a lack of closeness due to group differences reduced mimicry toward the elderly. As for synchrony findings illustrated in Manuscript 2, the experienced lack of closeness toward the elderly manifested itself as the young people's difficulties of predicting the elderly persons' behaviors and intentions, which then in turn impeded a successful temporal alignment of movements in order to be able to be in sync with the other person. In contrast, as described in Manuscript 2, behavioral mimicry and in particular findings regarding mimciry of head nodding may have served to reduce the experienced distance by communicating shared understanding and mutual acceptance, since head nodding has been found to hold the specific function especially in face-to-face interactions of signaling acceptance and agreement, which is similar to bowing (Helweg-Larsen, Cunningham, Carrico, & Pergram, 2004).

To sum up, since findings of emotional mimicry and behavioral synchrony revealed that old age poses difficulties within intergenerational interactions by reducing interpersonal coordination and thus aggravating a successful comunication, behavioral mimicry is the only aspect that serves its function. Meaning that in this case, mimicry served the function of "social glue", a term coined by Chartrand and Bargh (1999), which desribes mimicry as binding people together, linking them. Mimicking the elderly's head nodding showed the participants' motivation to express personal affiliation by converging their behavior toward the older person. Hence, young individuals are per se motivated to create positive

communication; otherwise they would diverge their behavior from the elderly in order to indicate a motivation to personally distance themselves. However, the findings regarding emotional mimicry and synchrony suggest that although young individuals may be motivated to have a successful interaction with the elderly, certain circumstances might prevent them from acting the same toward young and old interaction partners. Yet the findings described in Manuscript 3 gave a positive outlook on intergenerational interactions. We were able to show that it is possible to create a heightened motivation (conceivably more than usual) toward an older person which in turn positively influenced mimicking behavior toward the whole age group.

The Affective Context

However, not only group membership but also the exchange and convergence of affiliative signals (in our case emotional signals) are part of interpersonal coordination, in particular part of emotional mimicry. Indeed, findings revealed that the type of emotions displayed in facial expressions influenced emotional mimicry. As a matter of fact, anger expressions were only rarely displayed and mimicked, whereas happiness expressions were always expressed and mimicked within real-life interactions. These results are in line with previous research (e.g., Bourgeois & Hess, 2008; Hinsz & Tomhave, 1991) and highlight the importance of the sociability of the stimulus material. Findings regarding the complete Cyberball exclusion described in Manuscript 3, and also in past work using video stimuli (e.g., Hühnel et al., 2014) and still photos (e.g., Hühnel & Hess, 2014) depicting emotional expressions shown by elderly and young actors revealed that all emotions, even antagonistic emotions such as anger were mimicked. However, our findings in real-life interactions showed the opposite. Thus one should be careful in generalizing findings on emotional mimicry from a low social context, in which the mimicked targets consist of photos or videos, to a high social context where the mimicked targets are real interaction partners.

In contrast, other behaviors, such as foot tapping or face touching have not been considered to carry information per se about appraisals and intentions regarding an event as emotional signals do (cf. Hess & Fischer, 2014). However, when behaviors are mimicked or synchronized, they do carry affiliative signals, or social information: the willingness to create social connections. For instance, Miles and colleagues (2010) have found that synchronous behavior is related to the affective tenor of an interaction, with a positively valenced situation increasing interpersonal synchrony, whereas a negatively valenced situation decreased synchrony. Although the present synchrony results suggested an influence of the affective valence as well, we found them to be heading in a different direction. The findings indicated

that the narration of an anger-eliciting event resulted in higher synchrony compared to the synchrony during the narration of a happiness-eliciting event, suggesting a higher motivation to reduce the experienced lack of closeness or awkwardness caused by the negative valence of the situation. However, in contrast to the research by Miles and et al. (2010), who induced anger directed at the interaction partner, the current anger elicitation was not directed at a specific person but a third factor, thus enabling coordination behavior.

Furthermore, the affective valence of the situation also influenced emotinal mimicry. We found more mimicry of younger adults during the narration of the happy event, whereas that pattern changed during the narration of the angry event, where we found that happiness expressions of both, young and old adults were mimicked to the same degree. These results highlight the importance of the valence of a situation. In our case, this negative valence may have enhanced the empathy or even sympathy for the elderly, which then led to a greater effort of mimicking smiles, and this might be in particular beneficial during unpleasant situations in hospitals or hospices.

Taken together, the findings presented in this work illustrate that interpersonal coordination particularly within real-life interactions is effected by certain contextual factors such as the *social relational context*; in which group-membership accounted for differences between intergenerational and same-generation interactions. Moreover, for the *affective context*, the present research revealed that first, the type of emotional signal influenced mimicry of happy and antagonistic emotion expressions; and secondly, the affective valence within a situation had an effect on the degree of synchrony as well as emotional mimicry.

Future Research, Implications and Conclusions

Although the present work gives an overview of the communication between young and older individuals with a promising outlook, as young adults' motivation to affiliate with the elderly can be strengthened and positively influence intergenerational communication, some questions still remain open and need to be given attention in future research, which are discussed subsequently.

So far, we only looked at the emotional signal of facial expressions and its influence on mimicry of emotions. Naturally, since we also studied behaviors other than facial expressions, the question arises whether behavioral movements can be interpreted as emotional signals as well and whether these can influence behavioral mimicry. Although some body movements and postures, such as foot tapping are generally not considered to provide any information about the appraisal of emotions, certain body movements and positions can in fact hold an emotional meaning. Work of Wallbott (1998) as well as Dael and colleagues (Dael,

Mortillaro, & Scherer, 2012a, 2012b) indicated that there are indeed some emotion-specific body movements and postures. However, results are still inconclusive, because the correct interpretation has proven to be quite difficult, where only a few emotions were prototypically expressed by a specific pattern and the greater part of emotions were expressed via a wide range of patterns (Dael et al., 2012a). But for future research, the notion to develop a coding system for emotional expressions during intergenerational interactions may be worth pursuing in order to shed some more light onto the underlying mechanisms of intergenerational communication.

In addition, more research of the factors contributing to the experienced lack of closeness, which I proposed to be the underlying mechanism of intergroup differences regarding interpersonal coordination, should be conducted. As aforementioned, the stereotypes young adults have about the elderly might negatively influence their empathic behavior toward the elderly. In fact, recent work has shown that stereotypic emotion expectations about the elderly influenced emotional mimicry, in particular when they had time to elaborate their existing knowledge about stereotypes (Hühnel & Hess, 2014). These results are the first step into unraveling stereotypes to be one factor causing an experience of lack of closeness. However, as the current studies focused on behavioral mimicry and synchrony as well, knowledge other than stereotypes about emotions should be considered. Moreover, in previous work, young adults reported an unequal relationship to the older interaction partner, where they felt to be in the subordinate role, whereas the older adults held the superior role, resulting in holding back their own opinions to maintain respect and politness (Williams & Giles, 1996). Therefore, future research should not only consider stereotypical believes about elderly, but also the role allocation between individuals from different generations. As a matter of fact, past research has shown that status of interaction partners within face-to-face had some impact on emotional mimicry, suggesting that mimicry could be used as a strategy to "ingratiate" by low status adults (Hess & Bourgeois, 2010).

Additionally, we need to tap more into the topic of manipulating the motivation to affiliate. The study described in Manuscript 3 has been a first promising step into the right direction by experimentally heightening the motivation to affiliate, which positively influenced emotional mimicry toward facial expressions displayed by the elderly. The next step should be to take that to real-life interactions, manipulating the affiliation motivation toward the elderly possibly with the same ball-throwing computer game, then assessing their subsequent interpersonal coordination and test in a last step, whether an increase in

interpersonal coordination resulted in a more positive evaluation of the interaction, the interaction partner in particular, and the out-group in general.

Last but not least, future research should also consider older adults being participants, in order to study same-old-age interactions and contrasting these with same-young-age interactions. Moreover, it could be tested, whether reduced synchronous behavior could be explained by the older individuals' movement difficulties.

To conclude, the findings illustrated and discussed in this dissertation give us vital information about research on emotions, interpersonal coordination and the elderly. First of all, a comprehensive review of existing literature has shown that the combination of emotional and behavioral mimicry as well as synchrony in order to study the communication between different generations ranging from 18 to over 80 is a novum in psychological research. It is just the first step of many, because as the previous paragraphs have shown, much more research is needed in order to obtain a full image of intergenerational communication. Moreover, findings of real-life interactions have illustrated that one should exercise great care and be aware that different laboratory settings can lead to different outcomes, especially regarding emotional mimicry. Furthermore, findings have shown that young individuals are seemingly motivated to have a successful, positive and smooth interaction with the elderly. When they are enabled, they are willing to reduce an experienced lack of closeness by exhibiting even more behavioral convergence (behavioral mimicry), in particular toward older interaction partners, thus promising a positive outlook for intergenerational interactions. This is especially now of great importance as the Western population is growing older, and old age becoming a big and undeniable part of our everyday life.

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