Mimicry: A social perspective

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to Dennis,

Pride

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Chapter 1: Introduction and overview

Mimicry: A social perspective

If you take the time to look around, you will find out that people often mimic each other. Two lovers in a bar, who take over each other's posture while telling each other how much they are in love. Or two grandmothers who are nodding and taking over facial expressions as they discuss the latest news about their grandchildren. The apprentice takes over the posture of his boss. For example, when the boss picks up a pen to play with, the apprentice will too. Two children jump on the couch, crying, and screaming, but only one really saw a mouse. You will find out that mimicry is everywhere and most of the time people are not aware of the fact that they mimic or are being mimicked. Mimicry is an integral part of our daily social life, but remarkably little is known about its function.

In present dissertation, a broad definition of mimicry will be used – mimicry is having one individual doing what another individual does. The terms "mimicry" and "imitation" will be used interchangeably[1]. This dissertation examines the "when" and "why" of mimicry. In this chapter, after presenting evidence for the automaticity of mimicry, a social function of mimicry will be proposed. Then, an overview of the empirical chapters will be given and their role in supporting a social perspective on mimicry will be discussed. In the first part, evidence will be presented that people indeed have a tendency to do what others do, and it will be shown that this is a general and unintentional tendency, not directed at a specific goal. Specifically, in Chapters 2 and 3, studies which examine several moderators of our automatic tendency to mimic are described. In the second part of this dissertation, the adaptive value of mimicry is investigated. Specifically, studies in Chapter 4 and Chapter 5 illustrate the beneficial role mimicry plays in human interactions.

[1] Although in the literature, the term mimicry has also been used to describe instances in which an individual takes over features from the environment (a chameleon) or dangerous animals (a butterfly's camouflage resembling two big staring eyes) in order to fool predators, this form of mimicry will not be discussed.

The automaticity of mimicry

A considerable part of the behaviors we perform consists of doing what other people do. This may be conscious, when we decide to buy Nike sneakers in order to belong to the "cool" kids, but it also happens non-consciously. Humans have an innate and automatic tendency to mimic and mimicry has been observed for a wide variety of behaviors (for a review, see Chartrand, Maddux, & Lakin, in press). Numerous studies have found empirical evidence for the notion that mimicry is an integral part of daily life. For instance, people mimic words (Bock, 1986, 1989), accents (Giles & Powesland, 1975), rate of speech (Webb, 1969, 1972), tone of voice (Neumann & Strack 2000), syntax (Levelt & Kelter, 1982), laughter (Young & Frey, 1966), facial expressions (Hsee, Hatfield, Carlson, & Chemtob, 1990), emotions (Hatfield, Cacioppo, & Rapson, 1994), mood (Neumann & Strack, 2000), and physical mannerisms (Chartrand & Bargh, 1999).

Evidence for the automaticity of mimicry comes from several directions. First, the fact that neonates are imitators supports the notion that mimicry is an innate tendency (for a review, see Meltzoff & Moore, 1997). For example, newborns imitate facial movements (Meltzoff & Moore, 1977), facial expressions (Field, Woodson, Greenberg & Cohen, 1982) and vocal sounds (Kugiumutzakis, 1993). Mimicry has been observed from "day 1." Convincing evidence that mimicry occurs spontaneously and is not a behavior that is rapidly learned in the first weeks of life comes from studies on children who were literally just born. One study observed facial mimicry in forty children with a mean age of thirty-two hours, the youngest being no older than 42 minutes (Meltzoff & Moore, 1983, 1989).

Further evidence for the automaticity of mimicry comes from neuroscientific research on so-called "mirror neurons" (Gallese, Fadiga, Fogassi & Rizzolatti, 1996). This research shows that, within our brains, there is an intimate link between observing an action, performing the same action ourselves, and merely thinking about that action. The same areas in the brain that take part in performing a particular action are also activated when we merely perceive another person performing that specific action (Iacobini, Woods, Brass, Bekkering, Mazziotta & Rizzolatti, 1999). In addition, several theorists have proposed a close connection between perceiving and doing (Jeannerod, 1997; James, 1890; Prinz, 1990, 2002). Prinz (2002) for example, presents experimental

evidence for similarity between the cognitive processes underlying perception and action: “These observations suggest common representational resources for perception and action: perceptual cognition shares representational resources with action planning. Action imitation is therefore a natural by-product of action perception (and, hence, an important ingredient in many forms of social communication). In a way, then, the problem is not so much to account for the ubiquitous occurrence of imitation, but rather for its notorious nonoccurrence in many situations.” (p. 160).

When action is an automatic by-product of action perception, it requires an inhibitory process to stop its occurrence. Support for the notion that mimicry is the default and an inhibitory process is necessary to prevent its occurrence comes from studies which examined people who have damaged or not yet fully developed inhibitory control. The prefrontal cortex has often been associated with the inhibition of spontaneous behavior. At birth, the nervous system is characterized by a lack of inhibitory control. Because inhibition is difficult at earlier ages, it is not surprising that infants perform obvious imitative behaviors such as tongue protrusion and mouth opening. More mature individuals would normally be embarrassed by performing these behaviors and it would take liters of alcoholic beverages before one would be secretly caught in this action. Except when certain damage has been done to the prefrontal cortex. Patients who have bilateral prefrontal cortex lesions, for example, can display echopraxia, which is the unintended and automatic imitation of other people’s behavior (Luria, 1973). In addition, echolalia, which is the unintended and automatic imitation of speech can be observed in patients who, due to brain damage, lack the inhibitory capacity that is required to prevent perception from automatically releasing action (Minshew, Pettegrew, Goldstein, Phillips & Wendy, 1991).

Finally, there is also social psychological evidence for the automaticity of mimicry. For example, Chartrand and Bargh (1999) demonstrated that behavioral mimicry occurs spontaneously even among strangers in the most minimal of circumstances. In this research, participants interacted with an unknown confederate in two consecutive, brief picture-describing sessions. In one session, the confederate either rubbed her face or shook her foot while describing the pictures with the participants, while the second confederate performed the behavior that the first confederate did not.

The behavior of the participants, recorded on videotape, showed that participants shook their foot more in the presence of the foot-shaking confederate, and rubbed their faces more in the presence of the face-rubbing confederate. Debriefing indicated that participants were unaware of their mimicry.

Why do we mimic?

Although the above results provide convincing evidence that we automatically mimic other people, an important question that still needs to be answered is why we mimic? One way of answering that question is to look at the benefits which accrue from doing what others do. On the basis of the outcomes of mimicry, several possible functions have been proposed: a “safety by numbers” function, an acculturation function, and a social function.

First, in the animal domain (e.g., gnus and mackerels), it is argued that mimicry helps to enhance safety (Dijksterhuis, Bargh, & Miedema, 2000). By moving in large groups and fleeing when other individuals flee, animals increase their chances of survival. A gnu or mackerel that drifts away from its herd or school runs a greater risk of being eaten by one of the numerous predators than a gnu or mackerel that follows its other group members. Although for humans nowadays, the most dangerous nonhuman predators are locked up behind strong iron bars in the local Zoo, it is conceivable that human mimicry is partly based on this evolutionary heritage.

A second proposed function of mimicry assumes that imitating others might be a potent mechanism in learning and acculturation. There is some observational evidence that mimicry may indeed facilitate transmission of cultural behaviors in higher primates (De Waal, 2002). A lot of behavior and knowledge that is not innate, but of fundamental importance in functioning in social groups is transmitted through observational learning. By observing a model performing certain actions and imitating those actions we can acquire skills, which may be useful for survival in our environment and culture. Also in humans, vicarious learning is a powerful tool in the acquisition of all sorts of behaviors, ranging from a tennis stroke to the production of gold watches (Bandura, 1962). Among primatologists and psychologists, an influential view on mimicry posits that mimicry is a strategic behavior that is used in order to reach a goal or get instant reinforcement.

Several researchers, however, argue that mimicry does not necessarily have to be directed at a specific goal or serve as a tool to achieve instant reinforcement, but it may also be beneficial in social interactions. The work by these researchers suggests that there is also a social element to mimicry, which brings us to the third function: the social function.

The social function of mimicry

As Frans de Waal (2002) writes in describing an instance of imitation in chimpanzees: “I wonder where this behavior would fall under the usual classifications of imitation: no problem was being solved, no goal was being copied, and no reward was procured. […] It had an element of identification, of empathy and closeness, rather than the cool evaluation of goals and methods that the scientific literature proposes as the hallmark of imitation.” (p. 217).

Similarly, Kinsbourne (2002), in answering the question why do infants strive to interact rhythmically with caretakers, describes: “The other appears to the infant to affiliate with the infants’ own body sense, which, presumably positively valanced, may be the rudiment of social affiliation or bonding on the part of the child. Imitation fosters a pleasurable sense of kinship between parent and child.” (p. 325). Kinsbourne (2002) offers an intriguing explanation for the suggestion that the “other appears to the infant to affiliate with the infants’ own body sense.” Because of a lack of inhibitory control, seeing and doing are inseparable in infants; it thinks what it does and vice versa. When an infant watches its arm, it moves its arm. By watching it again, it moves it again until a new stimulus captures its attention. This is called self-imitation. Through this automatic sequence of perceiving and moving, a sense of body-ownership emerges. The infant learns that it is the owner of all that beauty. When a caretaker or any other person and the infant behave synchronically there is also an experience of similarity between seeing and doing. This may subsequently lead to the appearance that the other affiliates with the infants’ own body sense.

There seems to be more to mimicry than keeping yourself safe from predators or learning how to use a stick in order to reach for a banana. As the quotes by De Waal (2002) and Kinsbourne (2002) suggest, mimicry and the experience of being mimicked appear to be pleasurable in itself and related to the closeness we feel to others and others

to us. Then from a social perspective, mimicry is involved in the creation and maintenance of social bonds. It is important to realize, however, that such a social function still may be advantageous on an evolutionary level. Even if mimicry is not intentionally and strategically used to achieve instant reinforcement, it can be pleasurable in itself and beneficial.

De Waal (2002) proposes Bonding- and Identification-based Observational Learning (BIOL), in which the primary force behind imitation is a desire to be like others and belong to others. Whether or not that translates in direct and tangible rewards is secondary. Although the attractiveness of mimicry is then located in the act itself and not its proximal consequences, its distant and long-term effects still are beneficial for the individual. De Waal (2002) describes this as follows: "We are such law-of-effect creatures that we have trouble looking at imitation from a purely socioemotional perspective. […] But even if imitation is mainly socially driven, aimed at emulating favored models, the end result remains that habits and techniques spread through a population. It is at this level that the payoffs occur. The individual does not realize this, such as when a monkey learns to fear snakes without ever having been bitten or when a playing chimpanzee begins to combine stones with nuts. Insofar as conformist tendencies contribute to survival, they will be selected for." (pp. 231-232).

The following picture then emerges: Mimicry is an unintentional and non-strategic socially driven tendency. Mimicry should therefore be related to interpersonal closeness and occur when even when no direct or specific rewards are involved. However, for this tendency to be adaptive, beneficial consequences should still be accrued, either short- or long term. This may seem paradoxical, but the difference lies in the way mimicry is used. Is it used as an intentional tool in a specific situation, or is it used in general, with no actual goal in mind but still beneficial in certain situations? In both cases, mimicry leads to more positive outcomes. If assimilation to others is the driving force, however, mimicry should also occur when no tangible profits are at stake and should co-vary with closeness. Additionally, being unintentional and non-specific and based on the intertwined relation between interpersonal closeness and processing styles, mimicry should also be dependent on cognitive processing styles. Specifically, an assimilation mindset, which is associated with greater interpersonal closeness (Kühnen,

Hannover & Schubert, 2001; Nisbett, Peng, Choi & Norenzayan, 2001) would induce more mimicry than a differentiation mindset.

Observing that mimicry is not always used to intentionally attain specific outcomes, does not mean that it does not serve a long-term, more general function from which the individual benefits. Mimicry seems to affect people. Being mimicked, or the (nonconscious) experience of similarity between perceiving and doing (Nadel, 2002) may well serve as a proprioceptive cue that influences self-regulatory processes. Being in sync with our environment leads us to interact more harmoniously, assimilative and other-oriented compared to when no synchrony between ourselves and others is experienced. Therefore, mimicry will stimulate pro-social behavior within groups and, this way, stimulate successful social interactions. From this perspective, mimicry is a general, unintentional behavioral tendency that leads to non-targeted outcomes, which nevertheless, as a general process, contributes to our survival. It is important to note that the proposed social function of mimicry *adds* to the other functions rather than *replaces* them[2]. A "safety in numbers" explanation seems most relevant for instinctive and reflective behaviors, whereas a "learning and acculturation" function seems more relevant for situations where some form of elaboration or intention is present in the mimicker.

The present dissertation

In comparison with a "safety by numbers" or "learning and acculturation" account, the unique contribution of a social perspective on mimicry is its focus on the role of mimicry in creating and sustaining bonds between individuals and the subsequent beneficial social consequences that contribute to survival. There are two major assumptions embedded in this perspective. First, mimicry is socially driven and second, it has beneficial social consequences. Empirical support for the social function of mimicry is very scarce, however, and the present dissertation is aimed at experimentally investigating this proposed function of behavioral imitation. In this dissertation, the hypothesized social function of mimicry is based on four research questions which correspond with the four empirical chapters.

The present chapter serves as an overview and integration of the issues raised in the four empirical chapters. In this chapter, each of the four research questions will be introduced, the most relevant literature will be reviewed and the experiments addressing the research questions will be described and interpreted. Finally the implications of the experiments conducted in the four empirical chapters for the proposed social function of mimicry will be discussed.

-*Does interpersonal closeness moderate mimicry*? In order to investigate the assumption that mimicry is socially driven, Chapter 2 examines whether closeness to others moderates mimicry. Observing that mimicry occurs more often when we construe ourselves as interconnected to others, compared to when we are independent, would provide empirical evidence for the assumption that mimicry is socially driven. This is especially true when mimicry occurs even in situations where no concrete rewards are at stake.

-*Does cognitive processing style moderate mimicry?* Chapter 3 examines a second and closely related issue. If mimicry reflects a general tendency and not a strategic, intentional tool in concrete situations, mimicry should occur whenever the cognitive processing style associated with interpersonal closeness is active. Observing that the induction of processing style, which by definition is semantics-free, moderates mimicry would provide additional evidence for the general and non-goal specific nature of mimicry.

-*Is mimicry beneficial for the mimicker?* Although, from a social perspective, direct reinforcement is not the primary driving force of mimicry, it should have beneficial consequences on a behavioral level in order to be adaptive. Two research questions are formulated that investigate the consequences of mimicry. Chapter 5 examines whether mimicry leads to behavioral consequences, which are beneficial for the person who does the mimicry.

-*Are the beneficial consequences of mimicry non-targeted?* Based on the assumption that mimicry affects self-regulation, it is hypothesized that the consequences of mimicry are general and broad, not just targeted at the mimicker, which will be

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[2] Although the unintentional nature of mimicry is implicitly present in the “safety in numbers” function, and beneficial consequences for the mimicker are present in both functions, the social perspective is unique

examined in Chapter 4. In short, I will attempt in these four chapters to provide an empirical examination of the social perspective of mimicry.

Chapter 2: Self-construals and mimicry

The present viewpoint suggests that mimicry is related to interconnectedness, interpersonal closeness, affiliation, and empathy. Specifically, I propose that mimicry is more likely to occur when people construe themselves as connected to other people compared to when people perceive themselves to be independent individuals. Preliminary evidence for the relation between empathy and mimicry comes from Chartrand and Bargh (1999, study 3). In that study, participants high in perspective taking, which is an important aspect of empathy, mimicked others more than participants low in perspective taking. This suggests that personality characteristics influence our tendency to non-consciously do what others do. Mimicry, however, should not only vary between individuals, but it should also be moderated within individuals, depending on context. In particular, recent empirical evidence suggests that the self is more complex and flexible than previously suggested. Sometimes we feel close to others and are motivated by a need to belong, and sometimes we feel unique and independent, motivated by a need to be distinct (Brewer, 1991). The studies reported in Chapter 2 experimentally investigated the idea that self-construals can be influenced by social context and moderate mimicry.

Influential theories on the self acknowledge that the self consist of several parts. On the one hand people are unique and independent individuals with traits and characteristics that are independent of context. This has been called the *personal self* (Brewer, 1991; Brewer & Gardner, 1996) or *independent self* (Markus & Kitayama, 1991). On the other hand much of who we are is based on our relationships with other people; our family and friends and the groups we belong to. This part of the self accentuates inclusion of others in the self and a fundamental connectedness to other people and has been termed the *social self* or *interdependent self*.

While different self-construals tend to predominate in different cultures, research also indicates that both types of self-construals can coexist within the individual, and each type of self-construal may be activated at different times or in different contexts. Several researchers have demonstrated that independent and interdependent self-

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in combining and explaining these two elements in the added social context.

construals can be experimentally primed, indicating that contextual factors can influence which self-construal is active at any one time (Brewer & Gardner 1996; Gardner, Gabriel, & Lee, 1999; Kühnen, Hannover, & Schubert, 2001; Stapel & Koomen, 2001).

Recent work illustrates that self-construals have a profound impact on the way we perceive others, our environment, and ourselves (see Nisbett, Peng, Choi, & Norenzayan, 2001, for a review). For example, people with interdependent self-construals show fewer self-related biases, such as unrealistic optimism (Heine & Lehman, 1995; 1997) and false uniqueness (Markus & Kitayama, 1991), have an increased tendency to conform to situational norms (Kim & Markus, 1999), and to conform to the decisions of others (Iyengar & Leppar, 1999). The question remains, however, whether self-construals can also affect our unconscious behavior towards other people. Based on the hypothesized relation between closeness and mimicry and the fact that these construals of the self differ in the closeness to others, it is plausible that self-construal orientation moderates mimicry. The interdependent self is associated with assimilation and therefore this construal of the self will lead an individual to act in harmony with other people. In contrast, through the process of differentiation, an independent self-construal conflicts with doing what others do. Specifically, it is expected that an independent self-construal, either temporarily primed or chronically dominant, is associated with less mimicry than an interdependent self-construal.

In chapter 2, three studies tested this hypothesis. In Experiment 2.1, participants interacted with two different confederates in two consecutive sessions. In one session, participants were primed with words related to the independent self (“I”, “me,” and “mine”) and in another session with control words. As expected, the results indicated that participants in the control session mimicked the behaviors of the confederate, thereby replicating the finding that people have an automatic tendency to mimic others, even strangers (Chartrand & Bargh, 1999). When the independent self was activated, however, the same participants showed no mimicry. This preliminary evidence for an inhibitory effect of an independent self on mimicry suggests that mimicry automatically occurs in interactions, except when the independent self is active.

Based on the effects of self-focus on stereotyping (Macrae, Milne & Bodenhausen, 1998) and behavioral assimilation to stereotypes (Dijksterhuis & Van

Knippenberg, 2000), it is possible, however, that any reference to the self stops behavioral imitation, therefore in Experiment 2.2 an interdependent self-condition was added. Participants were first primed with a scrambled sentence task that either contained interdependent words (e.g. “I like to cooperate”) or independent words (e.g. “I like being unique”) or received no prime. Afterwards, they interacted with a pen-playing experimenter, while performing a listening task. During this task, the participants were secretly videotaped in order to see whether they mimicked the experimenter’s pen-playing behavior. As expected, it was found that activation of the interdependent self leads to more mimicry that the activation of the independent self with the no-prime condition falling in between. This implies that not all self-activation aborts mimicry, but only when that part of the self is activated that represents our uniqueness and independence is mimicry inhibited. Conversely, compared to the independent self, the activation of the interdependent self enhances mimicry, thereby highlighting the role mimicry plays in the creating and maintaining social bonds.

If self-construals moderate mimicry, as suggested, people who have on average more dominant interdependent construal of the self should mimic more than people with chronically independent social self. In Experiment 2.3, instead of temporarily activating self-construals, we examined cultural differences in chronically dominant independent construal of the self (Americans) or an interdependent construal of the self (Japanese). Participants interacted with either a Japanese or American confederate who performed face rubbing behavior and the participant’s behavior was secretly videotaped. Again more mimicry was observed in the interdependent self condition (Japanese) than in the independent self condition (Americans). No effect of the ethnicity of the confederate was found. However, a limitation of this experiment was that self-construal orientation has not directly been measured and Japanese and Americans differ on far more dimensions than self-construal orientation. It is therefore possible that a factor other than self-construal caused the difference in mimicry, although a large body of evidence exists suggesting that Japanese have a chronic interdependent construal of the self, while Americans have a chronic independent construal of self (for reviews, see Markus & Kitayama, 1991; Fiske, Kitayama, Markus, & Nisbett, 1998).

These three experiments provide support for the hypothesis that self-construals moderate mimicry. Specifically, when we are more concerned with relationships and feel connected to others, we will mimic other people's behavior. When we construe ourselves as unique and bounded individuals, mimicry will be inhibited. It is important to note that mimicry in the present studies occurred in a situation without any concrete rewards or incentives to affiliate. Participants did not gain anything from being mimicked or from being liked by the confederate. These results, therefore, can be seen as evidence for the assumption that mimicry is an unintentional tendency and not a strategy that is used in specific situations where obvious rewards are to be accrued.

To further disentangle an intentional view from a “mimicry as a general tendency” view, Chapter 3 examined the role of context-dependency in the moderation of mimicry. If mimicry is a general tendency to assimilate and not an action aimed at achieving a specific outcome, the induction of a cognitive processing style that is associated with assimilation should lead to more mimicry than a differentiation processing style. An advantage of inducing a cognitive processing style is that it is free of semantics, and therefore directly taps on a (hypothesized) generalized tendency. Observing that a context dependent processing style leads to more mimicry than a context-independent processing style would provide additional support for the view that mimicry is a general, non situation specific behavioral tendency.

Chapter 3: Context-dependency and mimicry

Research on the self (Markus & Kitayama, 1991; Cousins, 1989) and on social perception (Kühnen & Hannover, 2000; Stapel & Koomen, 2001; Kühnen et al., 2001; Nisbett et al., 2001) provides evidence that seeing oneself as fundamentally distinct and separated from others is associated with the process of differentiation, either differentiation of the self from others, or differentiation of individual objects from the environment as a whole. On the other hand, seeing oneself as fundamentally connected and similar to others is associated with the processes of assimilation and integration, with regard to the self as well as other objects (Markus & Kitayama, 1991; Masuda & Nisbett, 2001; Stapel & Koomen, 2001). For example, Kühnen et al. (2001) found that temporarily activating the personal self improves performance on the Hidden Figures Test (Witkin et al. 1957) compared to activation of the social self. In the Hidden Figures

Test, simple geometrical objects are hidden in a larger geometrical pattern and the participant's task is to detect the hidden figure. The more one is capable of differentiating between object and context, the better the performance on this task. In contrast, when the interdependent self is activated, performance on other tasks that require integration of objects in their contexts (e.g. detecting missing elements in a picture) is significantly better when compared to activation of the independent self. The research by Kühnen et al. (2001) suggests that there is a fundamental tendency to differentiate when the independent self is activated (see also Nisbett et al., 2001) and a fundamental tendency to assimilate when the interdependent self is activated. It is therefore conceivable that a context-dependent processing style (i.e. a general tendency to assimilate) is associated with more mimicry than a processing style that relies on differentiation and a nonsocial self-construal. If mimicry is an intentional behavior that is used to achieve instant reinforcement, no moderation of context-dependency is expected.

To test this assumption, Chapter 3 included two experiments which investigated the relationship between context-dependency and mimicry. In Experiment 3.1, participants first worked on the Hidden Figures Test and were instructed to detect as many given geometrical objects embedded in larger, more complex patterns, as possible within a fixed time period. Afterwards, they watched an 8 minute videotape on which a young woman performed several behaviors (i.e., face-rubbing, foot-shaking, and lip-moving). The participants were secretly videotaped in order to see whether they would mimic the person on the videotape. As expected, a correlation was observed between performance on the Hidden Figure Test and subsequent non-conscious mimicry. Participants who performed better on the HFT demonstrated less mimicry. These data suggest that a cognitive processing style that involves assimilation between context and focal object is associated with behavioral assimilation. Note that there was no real-life interaction, participants watched a person on videotape. This evidence provides additional support for the assumption that mimicry is not a strategic tool in specific situations. Mimicking a television set does not provide obvious rewards. To further examine the impact of processing styles on mimicry, we experimentally manipulated context dependency in a second study.

Specifically, in Experiment 3.2, participants in two different sessions engaged in tasks that either forced them to adopt a context-dependent processing style (e.g., solving a maze, or focussing on the big picture instead of its building blocks) or context-independent processing style (e.g., finding a street on a city map, or detecting a specific object). While performing these tasks, the confederate rubbed her face a couple of times a minute, and the behavior of the participant was secretly videotaped in order to assess the amount of mimicry. The results indicate that participants mimicked the behavior of the confederate to a greater extent when working on the context-dependent tasks compared to the context-independent tasks. In addition, a correlation was found between mimicry in general (i.e., irrespective of type of task) and performance on a measure of context-dependency (Kühnen & Hannover, 2002) which was an administered at the end of the experiment. In the latter task, participants were instructed to look closely at a sheet of paper which depicted several simple objects. Ninety seconds later, participants received an empty grid and were asked to recall as many objects as possible in their original location. The extent to which participants remember the location of an object is an indication of the contextualized memory of the object (Chalfonte & Johnson, 1996). An indication of a decontextualized memory is when participants remember an object, but not its location. The observed correlation between this processing style measure and mimicry replicates the results from Experiment 3.1. As in Experiment 3.1, more mimicry in a situation (an interaction or watching a videotape) was associated with better contextualized memory.

The results from Experiment 3.1 and 3.2 provide evidence for the assumption that a context-dependent processing style leads to more mimicry than a context-independent processing style and the findings from both Chapters 2 and 3 support the assumption that mimicry is a general non-specific tendency. Specifically, the results show that a semantics-free processing style, either manipulated or non-manipulated, was related to the amount of mimicry. In addition, evidence was obtained that participants still mimicked when there were no rewards and even when there was no real-life model present. In all experiments, there were no obvious gains to be accrued and in Experiment 3.1 the “other person” was only present on a TV-screen. These findings make it very

unlikely that the observed mimicry was intentional and aimed at gaining concrete rewards.

Although speculative, there may be an interesting relation between context-dependency, working memory (Baddeley, 1986), and the functioning of the prefrontal cortex. As described above, the prefrontal cortex is involved in the inhibition of mimicry. Based on the work on mirror neurons, common coding and neonates, doing what we see seems to be the default. As has been shown with patients who suffered damage to this brain region, the prefrontal cortex is involved in the inhibition of this automatic tendency (Luria, 1973). Interestingly, the prefrontal cortex, presumably through its relation with working memory, also plays an important role in controlled processing and the control of attention (conscious or nonconscious). Working memory has been shown to be related to inhibitory effects in perception. On the Stroop task, for example, working memory capacity is positively related to the inhibition of irrelevant stimulus properties and thus leads to better performance (Kane & Engle, 2001). Then it is possible that working memory, through its relation with the pre-frontal cortex also plays a role in the inhibition of mimicry. Thus, working memory activity may moderate mimicry. It is conceivable that a context-independent processing style requires more working memory capacity than a context-dependent processing style. For example, an independent self-construal requires a processing style that is independent of context (i.e., detaching focal objects from their respective environments). The independent self-construal is also associated with more rule based reasoning, where circumstances and situations are less influential compared to an interdependent self-construal, where context and circumstances are integrated in reasoning and attributions. In relating processing styles to culture, Nisbett et al. (2001) describe these styles as follows: “The authors find East Asians to be *holistic*, attending to the entire field and assigning causality to it, making relatively little use of categories and formal logic, and relying on “dialectical” reasoning, whereas Westerners are more *analytic*, paying more attention to the object and the categories to which it belongs and using rules, including formal logic, to understand its behavior.” (p. 291). Rule based processing and the use of formal logic may require more working memory capacity (Markovits & Barrouillet, 2002) than a more associative processing style and therefore more prefrontal cortex activity. This may explain the inhibitory effect of a

context-independent processing style on mimicry. Again, although speculative, this possibility is a challenge for further research on this topic[3].

Thus far, the studies presented investigated what moderates mimicry and provided evidence for the assumption that mimicry is a general, unintentional tendency that is socially driven. Mimicry occurred in situations without rewards or obvious social benefits. For mimicry to be functional, however, it should have positive consequences. If it serves a function in daily social life, more positive outcomes should occur when we mimic compared to when we do not mimic. It is important to note that even though mimicry is not an intentional tendency that serves instant gratification in specific situations, the process *itself* still should lead to desirable consequences, making it a mechanism that increases the chances of survival (De Waal, 2002). Chapter 4 and Chapter 5 experimentally manipulated mimicry in social interactions, and this way, systematically assessed its effects on the outcomes of these interactions.

Chapter 4 and 5: Consequences of mimicry

The relation between interpersonal closeness and mimicry may very well be bi-directional. The results presented so far show that an increased closeness to others or a general tendency to assimilate are associated with copying other people's behaviors. Performing the behavior we perceive someone else perform (imitation), or, nonconsciously, perceiving someone else perform the behavior we ourselves perform (imitation recognition) both involve a similarity in seeing and doing (Nadel, 2002). Based on the reasoning that the same capacity is required for the production of matched behavior and the detection of matched behavior, in combination with the finding that an increased closeness stimulates mimicry and the observed relation between closeness and mimicry, it is quite conceivable that mimicry, in turn, will affect interpersonal closeness and assimilation.

Several studies have provided preliminary evidence for this assumption. For example, Field (1977) found infants gazing more at their mothers, who mimicked them compared to non-mimicking mothers. In addition, Chartrand and Bargh (1999, study 2)

[3] It is important to note that several researchers have found that self-construals co-exist within individuals and are active depending on context (Brewer & Gardner 1996; Gardner, Gabriel, & Lee, 1999; Kühnen, Hannover, & Schubert, 2001; Stapel & Koomen, 2001) and no claims are being made about the rationality or cognitive capacities of Eastern and Western individuals.

experimentally manipulated mimicry and assessed its effects on liking and rapport. In their study, a confederate was instructed and trained to take over the posture and mannerisms of half the participants. For example, if the participant was leaning forward and touching her face, the confederate was instructed do the same thing. The other half of the participants were not mimicked and care was taken that, apart from the mimicry, the confederate acted similarly in both conditions. Afterwards, participants were asked to rate both their liking for the confederate and the pleasantness of the interaction. The results demonstrated that participants who had been mimicked by the confederate liked the confederate better and perceived the interaction as running more smoothly than participants who had not been mimicked.

The functionality of a process may be described in gains and losses on an adaptive level. To be adaptive it should increase the chances of survival, either of the individual, the genes or the species (Dawkins, 1976). Therefore, besides increasing liking and rapport, mimicry should also have positive consequences at a behavioral level in order to be truly adaptive (Dijksterhuis & Bargh, 2001; Milner & Goodale, 1995). Does mimicry increase pro-social behavior? Chapter 4 was designed to experimentally investigate the hypothesized social consequences of mimicry. Observing behavioral consequences that are beneficial to the individual would provide strong support for an adaptive perspective. Experiment 4.1 utilized a procedure by Chartand and Bargh (1999, Study 2) in which participant's behaviors and posture were mimicked or not mimicked by a naïve experimenter, while they were working on an irrelevant marketing study. After this study, the experimenter left the room to ostensibly collect material for a second task. Upon re-entering the room she "accidentally" dropped several pens and the dependent variable was whether or not participants would help the experimenter pick up the pens. As expected more participants in the mimicry condition helped the experimenter than in the control condition.

In Experiments 5.1 and 5.2 the pro-social consequences of mimicry were tested in a real life setting. It was expected that being mimicked makes people more pro-social. Both studies were run in a restaurant, in which a waitress either verbally mimicked or paraphrased her guests. The results from both studies indicated that the waitresses received larger tips after mimicking than paraphrasing. One possible alternative

explanation for these studies is that the experimenter or waitress may be perceived as more attentive in the mimicry condition than in the non-mimicry condition. This is unlikely for at least two reasons. First, as in Chartrand and Bargh (1999, study 2) the experimenter and waitresses were explicitly trained to behave equally across conditions, except for the mimicry. Furthermore, in the non-mimicry condition it is equally important to pay attention to the participant's behavior. To avoid the occurrence of mimicry in the non-mimicry condition one has to pay attention and be responsive to the posture and behaviors of the participant. Therefore, attentiveness is unlikely to be a confounding factor in the above mentioned studies. It is possible, however, that perceived attentiveness is an integral part of the effect of mimicry. Among several other possible effects, for example liking (Chartrand & Bargh, 1999) and attention (Field, 1977), perceived attentiveness of the mimicker by the mimicked may increase through mimicry.

It remains unclear how diffuse or specific these effects of mimicry are. What causes the observed beneficial consequences of mimicry? It may be the case that through mimicry "something special" develops between the mimicker and the mimicked, something that subsequently alters the way in which the mimicked perceives and behaves towards the mimicker. Alternatively, the (unconscious) experience of similarity between perception and action itself is enough to influence our interaction with the outside world. In this case, the similarity between what we see and what we do serves as a proprioceptive cue with self-regulatory consequences. In this latter explanation, no additional process is needed that takes the specific status of the mimicker into account. Observing that the consequences of mimicry are non-specific would support the assumption that mimicry is not a targeted, intentional behavior. When more people than the mimicker benefit from its consequences, it is likely that mimicry serves as a powerful tool in creating social harmony instead of being a strategically applied tool.

Consequences of mimicry for other people than the mimicker

Does mimicry make a person only more pro-social towards the person who mimics, or does mimicry affect a more general pro-social orientation, which is not directed at a specific target? A confounding factor in most research on the consequences of mimicry is that its possible effects are usually examined in relation to the mimicker. If the consequences of mimicry are not just targeted at the mimicker but consist of a pro-

social orientation in general, other people can benefit from a mimicked individual. In both cases the effects for the mimicker would be equal, but the effects for other people would differ. Therefore, to disentangle these two possibilities, Experiments 4.2 and 4.3 tested whether people other than the mimicker also benefit from a more generous mimicked person. Observing that other people are also treated more pro-socially by the mimicked person, would provide strong evidence for a pro-social-orientation-in-general explanation instead of an explanation where the mimicked receives a special and specific status. The procedure in Experiment 4.2 was closely related to Experiments 4.1 in which an experimenter either mimicked or did not mimic the participant's posture and mannerisms. This time, however, after finishing the marketing study, the experimenter told the participant that a new experimenter would give them instructions for a second task and left the room. When the new experimenter entered the room she "accidentally" dropped some pens. The results showed that the mimicked participants were more likely to help this new experimenter, thereby indicating that the more pro-social orientation of the participant is not just restricted to the person who performed the mimicry.

It is possible, however, that the observed effect on the second experimenter is based on a resemblance between her and the first experimenter. Both were experimenters, and maybe the effect is based on a transference of the pro-social orientation towards the first experimenter. To control for the possibility that the effect found in Experiment 4.2 was due to the similarity between the first and the second experimenter, Experiment 4.3 assessed the effects of mimicry on an abstract and absent entity: a charity. If pro-social behavior towards a charity is increased through mimicry, these effects can not be attributed to similarity between the mimicker and the person or entity that benefits from the pro-social mimicked person.

In Experiment 4.3, again the participant's posture and behavior was mimicked or not by an experimenter, while both were working on a marketing study. This time, instead of helping behavior towards a person, donations to a charity were measured. Participants were placed in a room by themselves and given the chance to anonymously donate money to a charity. The results showed that participants whose behavior had been mimicked donated a larger amount of money to a charity (i.e., the CliniClowns) than participants who had not been mimicked.

Taken together, these studies support the hypothesis that the effects of mimicry are general and diffuse instead of targeted only at the mimicker. The present studies imply that mimicry affects basic cognitive and behavioral processes. One way in which this could work is that being mimicked serves as a proprioceptive cue, which subsequently influences self-regulatory processes.

If mimicry affects self-regulation and not just the specific interaction with the mimicking person, it is conceivable that it also induces a processing style that involves assimilation and integration. In Experiment 3.3, the participant's behavior was mimicked or not by a confederate, while working on a marketing study and afterwards the degree of context-dependency was assessed, again using the memory grid (Kühnen & Hannover, 2002). The results show that mimicked individuals remembered more objects in their original location compared to non-mimicked individuals. The total amount of objects recalled did not differ, which means that mimicry only affected the contextualized memory for the objects, not memory in general. This provides further evidence for the generalized consequences of mimicry. The synchrony between what we do and what we perceive seems to function as a proprioceptive cue that influences subsequent cognition and behavior, which would be expected on the basis of the reasoning that the same capacity is required for the production of matched behavior and the detection of matched behavior (Nadel, 2002). No specific or special relationship between the mimicker and the mimicked is required to explain the pro-social consequences of mimicry.

How do the present studies support a social function of mimicry?

The current research has provided additional evidence of the social functionality of mimicry. In studying its moderators and consequences, we learn more about the adaptive role mimicry plays in our daily lives. Now we are starting to understand how and why lovers take over each other's posture, why the apprentice imitates his bosses' pen-playing, and why the two grandmothers nod and mimic facial expressions.

The combination of the four empirical chapters in the present dissertation paints a picture of mimicry that adds to existing views on mimicry. The studies mentioned above provide support for the proposed social function of mimicry: an unintentional socially driven tendency that contributes to our survival. The social aspect of this proposed function was observed in Chapter 2, 4, and 5. Specifically, in Chapter 2 interpersonal

closeness, temporary activated or chronically dominant, has been shown to moderate mimicry. Chapter 4 and Chapter 5 showed that mimicry has beneficial social consequences. Mimicry leads to more helping behavior and more money.

The present studies also provided evidence for the hypothesized unintentional and non-targeted nature of the proposed social function. Specifically, the experiments in this dissertation demonstrated that humans have a general unintentional tendency to mimic. In Chapter 2 and Chapter 3, mimicry was observed even in situations where no rewards could have been gained, for example superficial interactions with a confederate or when watching a TV-screen. In Chapter 2, manipulating self-construal orientation in general, irrespective of the specific relation with the other led to the moderation of mimicry. Additionally, in Chapter 3 the observed moderating role of context-dependency indicates that mimicry has a more general basis than being an intentional and targeted tool in specific situations. Further evidence for the non-specificity of mimicry came from experiments in Chapter 4, which provided evidence for the assumption that mimicry has beneficial consequences, which are non-targeted. Not only the mimicker profits, but also other people or entities profit from a more pro-social mimicked person. The effects thus seem to be diffuse, thereby indicating that a pro-social orientation in general is induced. Furthermore, in Experiment 3.3 evidence was found that being mimicked results in general context-dependent cognitive processing style. This suggest that the consequences of mimicry are broader and more general than just creating "something special" between the mimicker and the mimicked. Taken together, these results from the present dissertation add a social perspective to the already existing views on mimicry and are incompatible with an intentional view on mimicry where "the cool evaluation of goals and method [are] the hallmark of imitation." De Waal (2002, p.217).

Venues for further research

The finding that being mimicked or not affects our very basic cognitive and behavioral processing suggests that mimicry may serve as a proprioceptive cue that influences self-regulatory processes. When we detect similarity between what we do and what we see (perception-behavior link) this subsequently leads us to process stimuli and others in a more interdependent manner. Conversely, when perception and action are different from each other, we process and react in an independent manner. Although

speculative, it may be the case that a similarity between perception and action provides us with information about our interaction with the environment and the environment itself, parallel to a “mood as information” account (Schwarz, 1990; Schwarz & Bohner, 1996; Schwarz & Clore, 1996).

In the mood as information account, our present mood informs us whether the environment is safe or problematic. A negative mood tells us that things are problematic and a positive mood signals that things are fine. This way, our mood resembles an internal representation of the valence of our environment. Moods of participants have been shown to be affected by the valence of presented words, even when these words were presented subliminally (Chartrand, Bargh, & Van Baaren, 2002), thereby indicating that moods reflect the global goodness or badness of the situation we are in. In a similar vein, mimicry provides us with information about the status of our environment. When other people and we act in synchrony, this may convey the information that things are safe and unproblematic. Conversely, when there is a discrepancy between our environment and us, this serves as a cue signaling that something might be wrong. Parallel to the presence of a negative mood, which among other things, leads to more rule-based and less associative processing compared to a positive mood, the experience of non-mimicry subsequently leads one to process information less associative and behave less pro-socially than the experience of being mimicked. Further research is needed to investigate this hypothesized role of mimicry in self-regulation.

Another question that needs to be addressed is what mediates the effects of mimicry on pro-social behavior? Being mimicked leads to the activation of a context dependent processing style. Is this effect mediated by the activation of a social self-construal, in which a greater closeness to others is felt, does context-dependency mediate the possible activation of self-construal orientation, or are both independent and unmediated consequences? The present dissertation is inconclusive with regard to this mediational question, and further research on this issue needs to be conducted. However, the absence of an unambiguous and straightforward measure of self-construal orientation makes it difficult to measure this construct properly.

Although the studies presented in this dissertation support the hypothesis that the effects of mimicry are general and diffuse instead of targeted only at the mimicker, it is

possible that specific variables within the interaction have additional effects. For example, an activated goal to affiliate (Lakin & Chartrand, in press) has been shown to increase mimicry. Furthermore, the attractiveness, similarity, status and a host of other variable of one's interaction partner may independently influence the amount of mimicry in an interaction. It is also possible that the consequences of mimicry are somewhat stronger for the mimicker than for other people, which could be based on an implicit association between the, presumably positively valenced, similarity in seeing and doing and the person who is present at that moment. The message in the present dissertation is not that person variables or specific properties of the interaction between two people do not moderate mimicry or its consequences, but rather the message is that those variables are not necessary to explain the basic process and consequences of mimicry.

Final thoughts

From an evolutionary perspective mimicry also increases the newborn's chances of survival. As stated by Heimann (2002): "This capacity to react, to imitate, to create a sense of togetherness, is most likely a result of our evolutionary history. It has served our species and helped newborns to be taken care of by their parents. The chance for an infant to survive increases rapidly if the child is able to engage the caretaker in social situations that also evoke strong emotional responses in the adult." (p. 79). Humans who are capable of drawing attention, creating closeness and stimulating pro-social behavior have the highest chance of living a successful life.

Doing what others do maybe an essential mechanism in the survival of social animals such as humans. When you take the beneficial role mimicry plays in social life into account, it is no wonder that people imitate each other. The finding that mimicry increases pro-social behavior illustrates the important role it plays in human social interaction and possibly in the interactions in higher primates as well. Through the combination of its social consequences and its innate nature, mimicry is a very important tool in the creation and maintenance of groups of individuals. This way, mimicry is of fundamental importance for social animals, such as humans, who depend for a large part on others for survival. The more we learn about mimicry, the more we will notice how deeply this phenomenon is embedded in ourselves. I hope this dissertation will stimulate future research aimed at unraveling the mystery of mimicry.

Chapter 2: It Takes Two to Mimic: Behavioral Consequences of Self-Construals[4]

Abstract- The present studies demonstrated the moderation of self-construal orientation on mimicry. Recent research indicates that an interdependent self-construal, but not an independent self-construal, is associated with assimilation of the other to the self, while an independent self is associated with minimizing the influence of others on the self (Markus & Kitayama, 1991; Stapel & Koomen, 2001). Therefore, we hypothesized that an interdependent self-construal would be associated with more mimicry than an independent self-construal. When self-construal orientations were experimentally primed, as in Studies 1 and 2, independent self-construals produced less nonconscious mimicry than interdependent self-construals. When self-construals were examined as cultural differences with either a chronically dominant independent (Americans) or interdependent (Japanese) construal of the self, these results were replicated.

Historically, social psychologists have tended to think of the construct of "self" as an independent entity, as something that is separate and distinct from other people. However, more recent evidence, particularly from the cross-cultural domain, has begun to suggest that in many cases the construal of self depends largely on social variables, such as one's relationship with others, or one's membership in social groups (Brewer & Gardner, 1996; Markus & Kitayama, 1991). In other words, individuals may often seek to define themselves in terms of their relations with others or in terms of their group affiliations, the so-called *social self* (Brewer & Gardner, 1996). In fact, recent motivational theories have posited that connectedness and belonging with others make up fundamental human drives that individuals are constantly striving to satisfy (Baumeister & Leary, 1995; Brewer, 1991).

Initial research on different types of self-construals focused on cross-cultural differences. In an overview of the relevant literature, Markus and Kitayama (1991) argued that individuals with Western and Eastern cultural backgrounds differ in the way they perceive themselves in terms of their relationships with others. On average,

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[4] This chapter is based on: Van Baaren, R.B., Maddux, W.W., Chartrand, T., L., De Bouter, C., & Van Knippenberg, A. (in press). It takes two to mimic: Behavioral

Westerners and other members of *individualistic* societies tend to construe themselves in terms of their own unique personal traits and attributes (e.g., I am tall; I am a good swimmer), while East Asians and members of other *collectivist* societies tend to focus more on how the self is related to other people (e.g., I am John's friend; I am a mother) (Cousins, 1989; Ip & Bond, 1995; Markus, Mullally, & Kitayama, 1997). Westerners' focus on the personal self and de-emphasis of others has been labeled the *independent self-construal* by Markus and Kitayama (1991), while Easterners' tendency to focus on the social self has been labeled the *interdependent self-construal*.

In this framework, an independent self-construal accentuates self-related features and minimizes the influence of others in the self-schema, resulting in a bounded and autonomous self that is distinctly separate from others. Conversely, the interdependent self-construal represents inclusion of others in the self, particularly with regard to others who are part of important relationships, as well as in-group members from small, well-connected groups (Aron, Aron, & Smollan, 1992; Brewer & Gardner, 1996; Markus & Kitayama, 1991; Yuki, 2002). This idea is akin to the concept of a "relational self", as defined by Brewer and Gardner (1996), or the more interdependent social nature of women versus men in the West (Cross & Madison, 1997). This interdependent nature is reflected by the fact that Japanese, as exemplars of an interdependent society, show a tendency to relationship enhance, but show no tendencies toward self- or group-enhancement, in contrast with Westerners' robust tendencies to both self- and group-enhance (Endo, Heine, & Lehman, 2000). In addition, people with interdependent self-construals show fewer self-related biases, such as unrealistic optimism (Heine & Lehman, 1995; 1997) and false uniqueness (Markus & Kitayama, 1991), have an increased tendency to conform to situational norms (Kim & Markus, 1999), and to conform to the decisions of others (Iyengar & Leppar, 1999).

While different self-construals tend to predominate in different cultures, research also indicates that both types of self-construals can coexist within the individual, and that each type of self-construal may be activated at different times or in different contexts. Several researchers have demonstrated that independent and interdependent self-construals can be experimentally primed, indicating that contextual factors can influence

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consequences of self-construals. *Journal of Personality and Social Psychology*

which self-construal is active at any one time (Brewer & Gardner 1996; Gardner, Gabriel, & Lee, 1999; Kuhnen, Hannover, & Schubert, 2001; Stapel & Koomen, 2001). For example, Gardner et al. (1999) primed participants living in an individualist society (the United States) or a collectivist society (Hong Kong) with either a story that reflected independence or interdependence, or gave them no prime. Next, participants received a value inventory that consisted of items that reflected both an individualist and a collectivist orientation (Schwartz, 1992; Triandis, McCusker, & Hui, 1990). The results indicated that the priming procedure altered the value endorsements of participants; participants from the U.S. endorsed collectivist values to a greater extent when they were primed with an interdependent story compared to their control condition, and participants from Hong Kong endorsed individualist values more after an independence prime compared to participants in their respective control condition.

Further evidence for contextual influences on self-construals comes from a recent study by Stapel and Koomen (2001). Specifically, in a social comparison paradigm, it was consistently found that priming participants' interdependent self resulted in assimilation towards others, whereas priming participants' independent self resulted in a tendency to differentiate from others when describing oneself in relation to a target person. In their first experiment, for example, participants were given a priming task developed by Brewer and Gardner (1996), in which participants are instructed to circle all pronouns that appear in the text describing "a trip to the city." In the personal self condition, the pronouns were "I" and "me" appeared frequently; in the social self condition, the pronouns "we" and "us" appeared frequently; and in the control condition, the pronoun "it" was present a number of times. Participants then read about a target who was described as either successful or unsuccessful at academics and business. Afterwards, participants rated themselves on several traits. The results indicated that the self-evaluations of participants assimilated to the target in the social self condition (i.e., they rated themselves as relatively good in the success condition, but as relatively bad in the failure condition), while participants in the personal self condition tended to contrast their self-evaluative judgments away from the target.

Consequences of self-construals on information processing

Self-construals are of fundamental importance to the way we react and process information related to the social environment. As succinctly stated by Markus and Kitayama (1991):

> People in different cultures have strikingly different construals of the self, of others, and of the interdependence of the two. These construals can influence, and in many cases determine, the very nature of the individual experience, including cognition, emotion and motivation. (p. 224)

One of the most striking examples of the effect of self-construals on cognition is the heightened context-sensitivity of individuals with an interdependent focus. Collectivists and other people with interdependent self-construals are associated with a processing style in which the entire environmental field is taken into account. Individualists and people with independent self-construals are associated with a processing style that involves separating objects and people from their context (see Nisbett, Peng, Choi, & Norenzayan, 2001, for a review). Thus, the more one is attuned to others and the environment, the more holistic (vs. analytic) cognition becomes, and the more sensitive one becomes to context and contextual variation in the environment (Choi & Nisbett, 2000; Kuhnen et al., 2001; Masuda & Nisbett, 2001; Nisbett et al., 2001), and to group versus individual attributions of causation (Hong, Morris, Chiu, & Benet-Martizez, 2000; Morris & Peng, 1994).

This theorizing suggests that two different types of processing styles exist that are specifically related to certain self-construals (Nisbett et al., 2001). When individuals define themselves as fundamentally separate from other people and as unique and bounded individuals, they also apply this processing style to the social environment. When processing social information, they detach objects from their respective contexts and focus on the attributes of the object, reflecting a context-independent processing style. However, when individuals think of themselves as a part of a larger social context, and as fundamentally connected to and included with others, individuals tend to process social information in a manner that combines object and context into an integrated whole, reflecting a context-dependent processing style.

For instance, Ji, Peng, and Nisbett (2000) administered the Rod and Frame Test (Witkin, Lewis, Hertzman, Machover, Meissner, & Karp, 1954) to both East Asian and

American participants to examine whether they differed in their processing styles. In this paradigm, a rod is placed in a rectangular box and the participants' task is to indicate whether this rod is vertically oriented. Because of their heightened context-sensitivity, the orientation of the rectangular box itself influences this judgment more for context-dependent participants than context-independent participants. The performance by East-Asian participants indicated that they experienced more difficulty in processing the Rod independent of the frame than did American participants, which is consistent with the idea that East Asians process information in a more context-dependent fashion than Americans.

To directly assess the relationship between self-construals and context-dependency in information processing, Kuhnen and his colleagues (Kuhnen et al., 2001; Kuhnen & Oyserman, in press) primed either independent or interdependent self-construals and then measured the context-dependency in the information processing of participants. In one study, Kuhnen et al. (2001) first primed either independent or interdependent self-construals by means of a personal pronoun-circling task (Brewer & Gardner 1996; Gardner et al., 1999), and then administered the Embedded Figures Test (Witkin & Goodenough, 1977). In this task, simple geometrical objects are embedded in larger, more complex patterns. As expected, participants primed with independence were better at detecting these simple objects than participants primed with interdependence. These results suggest that an independent self-construal is associated with a context-independent processing style.

The studies described so far illustrate that self-construals have a profound impact on the way we perceive others, our environment, and ourselves. The question remains, however, whether self-construals can also affect our unconscious behavior towards other people.

Behavioral consequences of self-construalsCan self-construals affect nonconscious mimicry?

A central factor in the construal of the self is the closeness and similarity between the self and others. Research on the self (Markus & Kitayama, 1991; Cousins, 1989) and on social perception (Kuhnen & Hannover, 2000; Stapel & Koomen, 2001; Kuhnen et al., 2001; Nisbett et al., 2001) provides evidence that seeing oneself as fundamentally distinct

and separated from others is associated with the process of differentiation, either differentiation of the self from others, or differentiation of individual objects from the environment as a whole. On the other hand, seeing oneself as fundamentally connected and similar to others is associated with the processes of assimilation and integration, with regard to the self as well as other objects (Markus & Kitayama, 1991; Masuda & Nisbett, 2001; Stapel & Koomen, 2001). Given these basic assimilation and differentiation tendencies that accompany self-construal orientations, it is likely that these tendencies will also be observed on a behavioral level. In other words, when we perceive ourselves as similar to others and we have a tendency to assimilate, it seems likely that we will also behave similarly to others. In contrast, when we perceive ourselves as fundamentally distinct from others and we have a tendency to differentiate, we may also tend to behave differently from the people around us.

Perhaps the simplest and most fundamental social behavior is the tendency for people to nonconsciously mimic others. This effect has been observed for a wide variety of behaviors (for a review, see Chartrand, Maddux, & Lakin, in press). For instance, people mimic words (Bock, 1986, 1989), accents (Giles & Powesland, 1975), rate of speech (Webb, 1969, 1972), tone of voice (Neumann & Strack 2000), syntax (Levelt & Kelter, 1982), laughter (Young & Frey, 1966), facial expressions (Hsee, Hatfield, Carlson, & Chemtob, 1990), emotions (Hatfield, Cacioppo & Rapson, 1994), mood (Neumann & Strack, 2000), and, especially relevant to the present studies, physical mannerisms (Chartrand & Bargh, 1999).

While much of this research has focused on individuals mimicking others with whom they have an established relationship, Chartrand and Bargh (1999) demonstrated that behavioral mimicry occurs spontaneously even among strangers in the most minimal of circumstances. In this research, participants interacted with an unknown confederate in two consecutive, brief picture-describing sessions. In one session, the confederate either rubbed her face or shook her foot while describing the pictures with the participants, while the second confederate performed the behavior that the first confederate did not. The behavior of the participants, recorded on videotape, showed that participants shook their foot more in the presence of the foot-shaking confederate, and rubbed their faces more in the presence of the face-rubbing confederate. Debriefing indicated that

participants were unaware of their mimicry. Thus, this behavioral assimilation seems to occur automatically when people are in an interactive situation. However, based on the evidence that assimilation to others is more associated with an interdependent self-construal than an independent self-construal (Stapel & Koomen, 2001; Dijksterhuis & van Knippenberg, 2000), we propose that more mimicry will occur when the interdependent self is activated than when the independent self is activated.

The Present Research

In three experiments we tested the prediction that self-construal orientation affects nonconscious mimicry. In Study 1, we predicted that priming an independent self-construal would reduce mimicry compared to a control condition in which mimicry was expected to occur (Chartrand & Bargh, 1999). In Study 2, we predicted that participants in an interdependent-self priming condition would mimic more than participants in a control condition, who in turn would mimic more than participants in the independent-self priming condition. In Study 3, we investigated mimicking behaviors of participants who differed in terms of their *chronic* self-construal orientation. Specifically, we compared mimicking tendencies of participants with Eastern cultural backgrounds, who tend to have chronic interdependent self-construals, with participants of Western cultural backgrounds, who tend to have chronic independent self-construals (Markus & Kitayama, 1991). We predicted that Japanese participants, as exemplars of people from Eastern cultural backgrounds, would mimic more than Americans, who typified individuals from Western societies.

Study 1

In our first experiment, we compared mimicry in a control session and a session where the independent self was activated. The procedure was similar to the original procedure used by Chartrand and Bargh (1999). However, instead of using a picture-describing task, we used a task that unobtrusively activates or does not activate the independent self. In accordance with previous findings by Chartrand and Bargh (1999), we predicted that participants in the control session would mimic the behavior of the confederate. In the session where the independent self was activated, however, we expected no such behavioral assimilation.

Method

Overview. Participants interacted with two different naive confederates in two different sessions. In both sessions they worked on a bogus translation task. In one session the words were related to the independent self, in the control session the words were not related to the self. The confederates performed one of two behaviors: foot-shaking or face-rubbing. The confederate in session 2 performed the behavior that the confederate in session 1 did not perform. Participants were videotaped and two judges coded their behaviors to examine whether participants mimicked the behavior of the confederates.

Participants and design. Thirty-eight female undergraduate students from the University of Nijmegen were paid for their participation. The experiment had a 2 (behavior: foot-shaking or face-rubbing) X 2 (translation task: independent self or control) within-subjects design. The order of behaviors, confederates and translation tasks were counterbalanced across participants.

Procedure. Upon arrival at the laboratory, participants were led into a room by the experimenter and seated in such a way that they were completely visible to a camera concealed in a fire detector attached to the ceiling. After seating the participant, the experimenter brought in a second "participant," who in fact was a confederate. The confederate's chair half-faced the participant and half-faced the experimenter. After the confederate arrived in the room, the experimenter seated himself behind a desk in such a way that his arms and legs could not be seen by the participant. The experimenter explained to participants that they would be asked to complete a language-experiment that tested an alleged "feeling for grammar." Participants were told that, although they are not familiar with a language, they still have some implicit knowledge about grammar. The task of the participant and the confederate was to take turns reading aloud sentences in a bogus language, which was introduced as an actual Polynesian language. In all sentences one word was replaced with a blank and participants were asked to guess the Dutch translation of the word. In the independent self condition the words they could choose from were "I," "me," and "mine." In the control condition, the words were "he," "him," and "his". After the confederate read the first sentence and randomly chose a word, the participant read the second sentence and chose a word until all fourteen sentences were read. During the task, the confederate either rubbed his face or shook his

foot. The confederate was trained to display four of the intended behaviors per minute. The session lasted approximately five minutes.

After the first session, the experimenter informed the confederate and the participant that there would be a second session and that they would complete their tasks with a new partner. The confederate was instructed to follow him to another room to meet a new "participant". After one minute the experimenter returned to the experimental room with a new confederate. The procedure was similar to the first session with two minor modifications. The participant and the confederate were given a different though similar translation task, and the new confederate performed the behavior not displayed by the confederate in the first session. All confederates were unaware of the hypotheses. Each participant received both the independent self-session and the control session in a counterbalanced order. Following the second session, the participant was led into another room in which she was asked to sign the video release form and was debriefed.

Results and discussion

Interjudge reliability. Two judges blind to experimental conditions coded the videotapes. For each session the following variables were coded: face-rubbing, foot-shaking, and smiling. The interjudge reliabilities were high: footshaking $r = .98$, face-rubbing $r = .97$, and smiling $r = .86$. Therefore a mean rating of the two judges was taken and divided by the duration of the interaction. Each participant, therefore, had three scores which reflected the frequency per minute of each behavior.

Mimicry. Because there was no difference between the frequency of foot-shaking and face-rubbing, these behaviors were combined in an index of imitative and non-imitative behaviors. Specifically, the imitative behavior was face-rubbing when the confederate rubbed his face and foot-shaking when the confederate shook his foot. Non-imitative behavior was face-rubbing when the confederate shook his foot and foot-shaking when the confederate rubbed his face.

To examine the effect of an independent self-construal on mimicry, a 2 (Translation Task: self-focus or control) x 2 (Behavior: imitation or non-imitation) repeated-measures analysis of variance was executed on the behavior scores. A main effect of Translation Task was found, $F(1, 37) = 11.21$, $p < .01$. Participants performed more behaviors in the control session ($M = .81$, $SD = .47$) than in the independent self-

session (M = .64, SD = .42). As expected, this effect was qualified by a significant Translation Task x Behavior interaction, $F(1, 37) = 4.43$, $p < .04$ (see Figure 1). Simple effect analyses confirmed that participants in the control session showed the imitative behaviors more (M = .97, SD = .76) than the non-imitative behavior (M = .56, SD = .40), $F(1, 37) = 5.48$, $p < .03$. In the independent self session, there was no significant difference between the imitative (M = .65, SD = .46) and the non-imitative (M = .72, SD = .66) behavior, $F(1, 37) = 2.09$, *ns*.

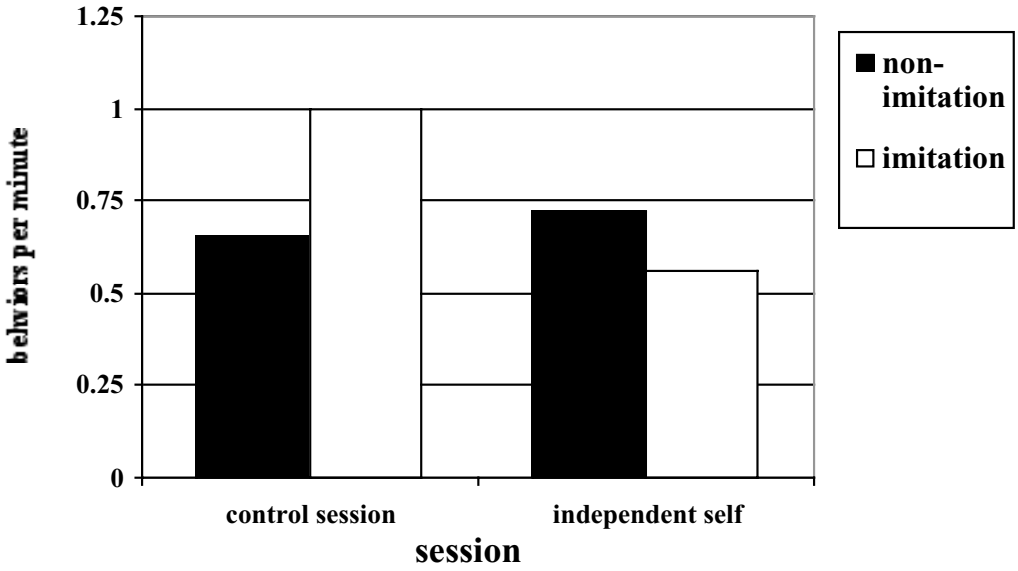

Figure 1: Amount of Mimicking by behavior and self-construal, Study 1

These results confirmed our expectations and provided initial evidence that self-construals moderate unconscious mimicry. In the control session, participants mimicked the mannerisms of a confederate; they rubbed their face when the confederate rubbed his face, and they shook their feet when the confederate shook his. This study replicates previous research showing that people have an unconscious tendency to mimic others (Chartrand & Bargh, 1999). However, when the independent self-construal of these participants was activated, they did not mimic the mannerisms of the confederate. While in a normal interaction, even strangers have a tendency to assimilate their behavior to

others; when an independent self-construal is activated, however, this tendency is reduced.

Study 2

Study 1 was successful in demonstrating the moderating role of an independent self-construal on mimicry. It is unclear, however, whether mimicry will occur when an interdependent self-construal is active. Although one could argue that any reference to the self will result in a cessation of environmental influence on behavior (Dijksterhuis & van Knippenberg, 2000), the present theorizing suggests that while activation of the independent self decreases mimicry, activation of the interdependent self will increase mimicry. In order to test this assumption, Study 2 included three conditions: an independent self condition, an interdependent self condition, and a control condition. To activate the independent and interdependent self-construals, a scrambled sentence task (Kuhnen & Hannover, 2000) was utilized.

In Study 2, we also introduced a new target behavior. Instead of face-rubbing and foot-shaking, the confederate was instructed to pick up and put down a pen several times during the interaction. Like face-rubbing and foot-shaking, pen-playing is a natural but unobtrusive and unambiguous behavior that can be observed in a variety of situations. Changing the dependent variable of interest allowed us to investigate the generalizability of nonconscious mimicry to other behaviors. In contrast to Study 1, which used a within-subjects design, Study 2 introduced a between-subjects design to examine the effects of priming.

Method

Overview. Some participants were first presented with a scrambled sentence task to activate either the interdependent self or the dependent self. Next, participants interacted with an experimenter on an irrelevant listening task. During this phase, the experimenter played with a pen. The participants' behavior was videotaped to examine whether he or she mimicked the experimenter's behavior.

Participants and design. Eighteen male and thirty-three female undergraduate students from the University of Nijmegen were paid for their participation. The data from three participants were excluded from analyses because they failed to correctly complete

the scrambled sentence task. The experiment had a single factor (Self-construal: independent, control or interdependent) between-subjects design.

Procedure. Upon entering the laboratory, participants were escorted to a room by an experimenter who was blind to condition. A hidden camera was placed in a fire detector, hanging from the ceiling. The experimenter informed participants that they would be asked to participate in several independent tasks. In the first task, participants received 18 scrambled sentences (Kuhnen & Hannover, 2000) in which participants were either primed with the independent or dependent self. Kuhnen and Hannover (2000) successfully used this scrambled sentence task to manipulate perceived self-other similarity, which increased after interdependence priming and decreased after independence priming. Each sentence consisted of five words which were not in the correct order, and participants were asked to make a grammatically correct four-word sentence (e.g., “a bike fiercely rides he” becomes “He rides a bike”). In the independent self condition, 15 of the sentences contained a word related to the independent self (e.g., unique, alone, individual). In the interdependent self condition, 15 of the sentences contained a word related to the interdependent self (e.g. together, group, cooperate). Participants in the control condition were not primed and therefore did not receive the scrambled sentence task.

Participants were instructed to tell the experimenter when they had finished, who then entered the room and sat behind a table at a 90-degree angle to the participant. The scrambled sentence task and the pen were in front of the participant, but behind a CD player that blocked them from the experimenter’s view. The experimenter explained that the participant would listen to four music fragments and then rate each fragment. The experimenter would write down the ratings on a sheet of paper. During the task, the experimenter was instructed to act in a neutral manner and to play with his pen approximately 5 times a minute. The number of seconds the participant played with the pen during the music-rating task was the main dependent variable. Note that the participant did not need a pen for this task, because the answers were given verbally. After the music task, the participant was asked to sign a video release form and was debriefed.

Results and Discussion

It was hypothesized that the most mimicry would occur in the interdependent self condition and the least mimicry in the independent self condition. In order to test this hypothesis, the amount of pen-playing[5] was entered in a one-way factorial (Self-Priming: independent, control or interdependent) ANOVA. A main effect of self-priming was found, $F(2,46) = 4.40$, $p < .02$. Contrasts revealed that participants in the independent self condition played significantly less with their pen ($M = 1.39$ sec, $SD = 3.35$) than participants in both the control condition ($M = 4.38$ sec, $SD = 5.00$), $t(46) = -2.01$, $p < .05$, and participants in the interdependent self condition ($M = 6.80$ sec, $SD = 7.09$), $t(46) = -2.59$, $p < .01$ (see Figure 2.). Although the contrast between the interdependent and the control condition was not significant, $t(46) = .59$, *ns*, a strong significant linear trend ($t = 2.95$, $p < .005$) indicated that mimicry in the interdependent self condition was highest, followed by mimicry in the control condition, and finally by mimicry in the independent self condition[6].

Together with Study 1, these results demonstrate that self-construals moderate nonconscious mimicry. While priming the independent self-construal led to less mimicry than in a control condition, priming the interdependent self-construal led to more mimicking than in the control condition. However, although the means differed considerably in the predicted direction and a strong linear trend was observed, no significant difference was found between mimicry in the control condition and the interdependent self condition.

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[5] Pen-playing is an unambiguous behavior that is easily detected compared to foot-shaking and face-rubbing, which leave more room for discussion when coded. Therefore only one judge coded the behavior.

[6] For Studies 2 and 3, additional analyses were performed including gender of the participants as a factor. Neither study found any significant effects, F's < 1. We believe that one might have predicted gender moderation of mimicry given the literature concerning chronic gender differences in relational interdependence (Cross & Madson, 1997). We did not find such moderation in the current studies. However, we believe that this may be because we did not have sufficient statistical power to test such a model, which would involve systematically crossing participant and confederate gender.

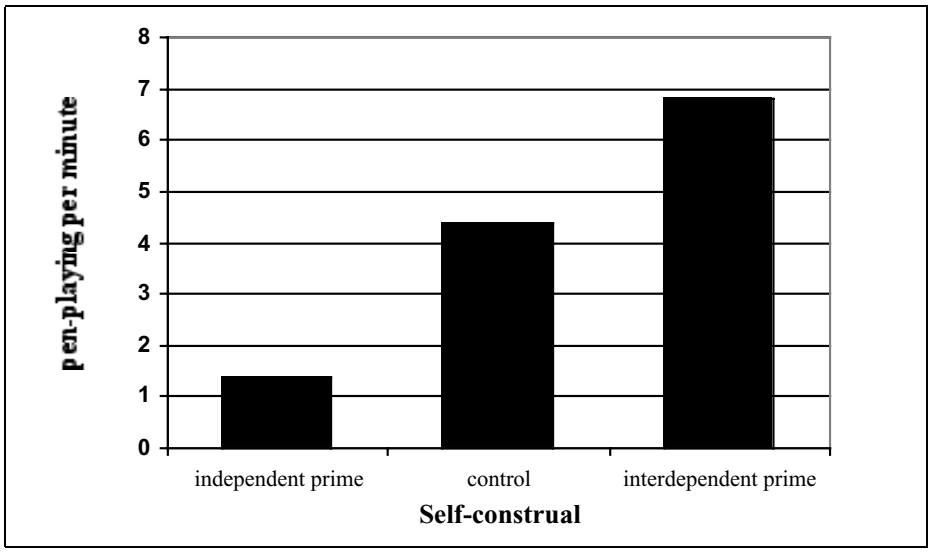

Figure 2: Amount of Mimicking, Study 2

From a theoretical point of view one could argue that a control condition may be a difficult concept when studying self-construals. It is not unlikely that at any given point of time both self-construals are active to some degree. Perhaps a no-priming condition reflects nothing more than a mixture between participants with a (temporarily or chronically) dominant independent self-construal and participants with a (temporarily or chronically) dominant interdependent self-construal. However, despite the nonsignificant difference between the interdependent condition and the control condition, our emphasis theoretically and empirically is on the comparison between the independent and interdependent self, a comparison that was highly significant.

Study 3

Results from Studies 1 and 2 indicate that priming an interdependent self-construal leads to more mimicry than priming an independent self-construal. While both of these studies temporarily activated these constructs via priming manipulations, an additional means of testing the reliability of these effects is by comparing behaviors of

participants whose self-construals are *chronically* independent or interdependent. Thus, Study 3 focused on the distinction between participants with chronic self-construal differences.

A large body of evidence exists suggesting that Japanese have a chronic interdependent construal of the self, while Americans have a chronic independent construal of self (for reviews, see Markus & Kitayama, 1991; Fiske, Kitayama, Markus, & Nisbett, 1998). Compared to Americans, Japanese tend to make more references to others when describing themselves, have less knowledge of themselves and more knowledge about other people, and tend to describe themselves within specific social contexts rather than in terms of concrete, immutable characteristics (Cousins, 1989; Markus & Kitayama, 1991; Markus et al., 1997). In addition, whereas Americans show robust tendencies toward self- and group-enhancement, Japanese only show enhancement tendencies with regard to their relationships with others (Endo, Heine, & Lehman, 2000). Finally, Japanese and other East Asian groups have been shown to be especially concerned with harmonious interpersonal relationships, even more so than with their own personal self-esteem (Kwan, Bond, & Singelis, 1997.) These findings are strong evidence for the interdependent, relationship-focused nature of the Japanese self-construal. Thus, in Study 3 we compared the mimicking behaviors of Japanese, who have well-documented chronic interdependent self-construals, with the mimicking behaviors of Americans, who tend to have more chronic independent self-construals.

Method

Participants. Thirty-four students at the Ohio State University participated. Data from three participants (two American males and one Japanese male) were excluded from analyses because of suspicions as to the veracity of the cover story, leaving the data from thirty-one participants for formal analysis. Sixteen participants were American (born and raised in the United States), and nine of these participants were female and seven were male. Sixteen participants were Japanese (had come to the United States from Japan within the previous four years), and ten of these participants were female and five were male. All American participants were introductory psychology students recruited via the university's on-line research sign-up program. Eight of the fifteen Japanese participants were also recruited in this manner. However, in order to get a larger number of Japanese

to participate in the study, seven Japanese participants were solicited off campus (via Japanese student groups) and offered $5 to participate in the experiment. All participants solicited in this manner were undergraduates or graduate students.

Procedure. The procedure essentially followed the basic procedure outlined in the Chartrand and Bargh (1999) studies. Participants were met by a white male experimenter at a designated waiting area. The experimenter called out the name of the participant as well as a second name. The second name was always the name of the first confederate (C1), who, as part of the cover story, was ostensibly late and not present during the name call-out. Participants were then led to the experimental room and told to wait for a few moments for the second "participant" to show up. The participant was instructed to sit in a chair facing two cameras on the opposite walls that were disguised as stereo speakers. The experimenter then left the room, and entered the control room next door. In order to get a baseline measure of the participants' habitual movements, the experimenter recorded the participant for one minute before beginning the session.

After one minute, the experimenter and C1 entered the room together. C1 was either an American female or a Japanese female, and the order in which the confederates presented themselves was randomly determined before the session. The experimenter explained that the second "participant" had just arrived and that they would now begin. C1 sat in a chair directly opposite the participant. This seat was positioned so that the confederate was in direct view of the participant, but out of view of the cameras.

The experimenter then delivered the cover story. He explained that the experiment was concerned with the development of a new projection test, and that it was the job of the participants to look at a series of pictures and describe them to the other person. The experimenter explained that the purpose of the experiment was to determine how easy or difficult it was to describe these particular pictures, which would help determine whether or not to use them for the projection test. Participants were then told that they were to talk about what they saw in each picture for approximately one minute, and to describe the pictures to the other person. The experimenter explained that what was said about the photographs was unimportant, that the focus was instead on the ease or difficulty with which they could be described. If the participants were Japanese students who had been explicitly recruited on campus, they were told that they were recruited because we were

looking for a diverse group of people to take part in the experiment, not just native-born Americans, and that the Japanese were our target group for Asian participants.

The experimenter then handed the participant and C1 two different sets of three laminated 8 x 10 photographs face down, with instructions not to look at them yet. The sets of photographs were taken from a set of 12 total photographs used in the experiment. The participants always described the same six photos, but these six were broken into two sets of three for each interaction. The photographs were taken from *Time* and *Life* magazines, and included a range of scenes that varied in emotional content, action, and ambiguity. Care was taken so that participants (and confederates) described a set of photographs in each interaction that was fairly neutral overall in emotional content.

The experimenter then sat in a chair that was at approximately a 75-degree angle to the right of the participants so that he was out of their direct field of vision. Although participants could not see the experimenter without turning around, as a precaution against mimicking the experimenter, he was instructed to remain still while he was in the room.

At this point, C1 was always instructed to describe her first picture. C1 turned over the first photograph and described it, following a memorized script to ensure that responses were standardized across participants. Confederates were instructed to act and speak naturally, with natural pauses and hesitations, and to be somewhat but not overly friendly. Confederates were also instructed to rub their faces or head/hair area constantly but naturally and subtly during the interaction.

Following C1's first description, the experimenter interjected that the level of description and length was appropriate, and asked the participant to turn over the first photograph to begin describing it. Participants and C1 continued taking turns describing the photographs until each had described the set of three.

At this point, the experimenter took the photographs and explained that this particular part of the experiment was complete. Participants were told that there was another pair of participants in the next room performing the same task, and that they were going to switch partners. The experimenter asked C1 to come with him to the next room, and told the participant that he would return momentarily with another ‘participant.’ The experimenter and C1 then left the room, and the experimenter and C2 entered the room a

few moments later. The second interaction followed the same format as the first, the only differences being that the sets of photographs were different, and that the participant was asked to begin the round of photo descriptions this time. C2 also spent the entire interaction touching her face/head area.

Following the second interaction, the experimenter explained that a series of follow-up questions would be administered to determine participants' views of the ease of description for the photographs. The experimenter said that in order to give each person enough privacy, one person would be taken to another room to work. The experimenter then gave each person a short questionnaire with several questions about how easy or difficult the photographs were to describe, and asked C2 to accompany him to another room. The experimenter and C2 then left the room.

The experimenter returned in a few minutes to collect the questionnaire and to administer the debriefing. All participants received a "funneled debriefing" (Bargh & Chartrand, 2000). Questions were asked with increasing specificity that probed for suspicions about the cover story, the mannerisms of the confederate, and the true purpose of the experiment. Following the debriefing, the true purpose of the experiment was explained to participants. Participants were asked to sign a video-release form, paid for their participation (if payment was promised) and thanked for their time.

Results and discussion

Interjudge reliability. Videotapes were coded by two independent judges blind to the hypothesis of the study. The total length of time (in seconds) each participant spent per minute rubbing his or her face was the main dependent measure. Three separate measurements were taken, one for the one-minute baseline period, one for the interaction period with the Japanese confederate, and one for the interaction with the American confederate. Reliabilities were $r = .84$, $r = .74$, and $r = .52$, respectively, with the first two being significant at the $p < .001$ level, and the third at $p < .01$[7]. The mean of the two

[7] While interjudge reliabilities were lower in Study 3 than in Study 1, observed reliabilities were on par with what has been found in previous mimicry studies. For example, in Study 1 of the Chartrand & Bargh (1999) research on nonconscious mimicry, interjudge reliabilities for the amount of face rubbing exhibited by participants ranged from $r = .33$ to $r = .60$.

judges' ratings of face-rubbing per minute were then taken as a single index for use as our main dependent measure.

Analysis of mimicry. Our main hypothesis was that Japanese participants would mimic more than American participants, due to their chronic interdependent self-construal. To test this, a repeated-measures ANOVA was conducted, with Participant Race (Japanese or American) as the between-subjects factor, Confederate Race (Japanese or American) as the repeated, within-subjects factor, and time spent face-rubbing as the dependent variable. As predicted, a main effect of Participant Race was revealed, $F(1,29) = 7.40$, $p = .01$, with Japanese participants spending a longer amount of time mimicking ($M = 6.79$ sec/min) than Americans ($M = 2.29$ sec/min). Simple effects tests revealed that Japanese participants mimicked both the Japanese confederate [$F(1,30) = 5.80$, $p < .02$,] and the American confederate [$F(1,30) = 4.12$, $p = .05$] more than American participants did. There was no main effect of Confederate Race, and no interaction between Confederate Race and Participant Race, Fs < 1.0. Interestingly, the lack of interaction suggests that Japanese participants did not mimic the Japanese confederate significantly more than the American confederate, and American participants did not mimic the American confederate more than the Japanese confederate. Simple effect tests revealed this to be true, Fs < 1. Thus, Japanese participants mimicked more than American participants, regardless of the race of the confederate. Finally, no significant effects emerged in mimicking when comparing Japanese participants who volunteered for the experiment and Japanese participants who were recruited on campus, Fs < 1.

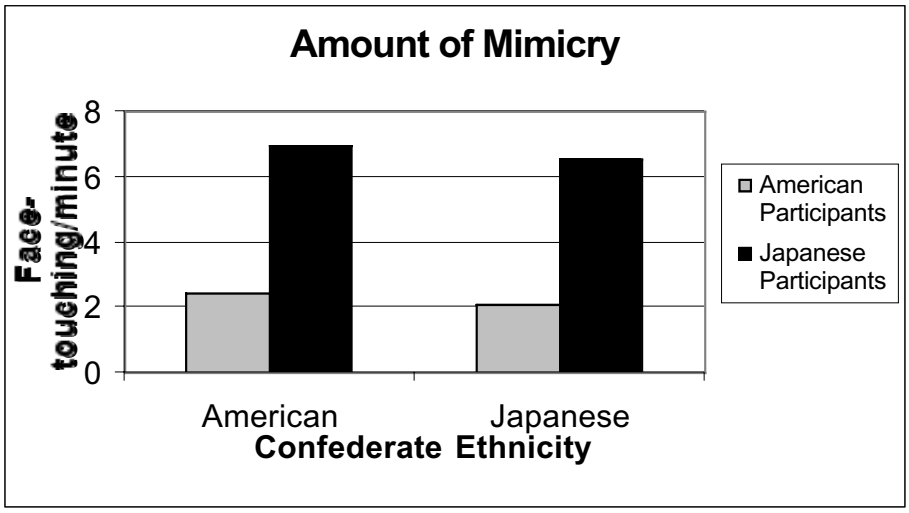

Figure 3: Amount of Mimicking by Participant and Confederate Ethnicity, Study 3

In order to rule out the possibility that the face-rubbing exhibited by Japanese was the result of habitual movements rather than actual mimicking behavior, we compared the face-rubbing exhibited by both groups during the one-minute baseline taken prior to the experimental interactions. Analyses revealed no significant differences in habitual face touching between the two groups during the baseline phase ($F < 1$).

Awareness of mimicking. In order to demonstrate that the mimicking was occurring nonconsciously, participants were probed for awareness concerning a) the mannerisms of the confederates, and 2) the purpose of the study. All participants completed a funneled debriefing (Bargh & Chartrand, 2000) that was administered orally by the experimenter. When asked if anything about the confederates stood out to them, no participants spontaneously mentioned face-rubbing. When directly asked about mannerisms of the confederates, none mentioned that they had noticed the face-rubbing, implying that they did not consciously mimic the mannerisms of the confederates. Finally, none of the participants guessed the actual purpose of the experiment, again

suggesting that they were unaware that they had mimicked the confederates' mannerisms during the interactions.

Discussion

The results from Study 3 indicate that chronic differences in self-construal orientation can lead to differences in mimicking behaviors. In this case, Japanese participants mimicked both a Japanese and an American confederate more than American participants did. Because Japanese are typically thought of as having a chronic interdependent orientation while Americans are thought of as having a chronic independent orientation (Markus & Kitayama, 1991), the results are consistent with those obtained via the priming paradigms in Studies 1 and 2. Interestingly, the race of the confederate played no role in the mimicking behaviors of Japanese. They did not mimic an ingroup confederate more than an outgroup confederate, indicating that their tendency to mimic was not inhibited by group boundaries. However, this result is consistent with recent research suggesting that when ingroups are large and diffuse (in this case, the nationality of being Japanese), Japanese people tend to be much less loyal to such groups than Americans (Yuki, 2002). This research suggests that for Japanese, the notion of an ingroup is not defined as much by group boundaries as it is by the strength of a network of relationships. Thus, the fact that participants and confederates were strangers may have minimized or even eliminated any tendencies for Japanese participants to mimic the Japanese confederate more than the American confederate, since group boundaries may not have been particularly salient to Japanese participants in such a situation.

General Discussion

The main purpose of the present research was to investigate the impact of different self-construal orientations on nonconscious behavior. Because an interdependent self-construal is associated with assimilation of others to the self, while an independent self-construal is associated with exclusion of others from the self, we specifically predicted that individuals with interdependent self-construals would exhibit greater mimicry than individuals with independent self-construals. Across three studies and focusing on several different types of behaviors, our results consistently supported this prediction. In Study 1, participants primed with the independent self-construal mimicked the habitual movements of confederates significantly less than when they were

not primed. In Study 2, participants primed with the independent self mimicked significantly less than non-primed participants, replicating the results from Study 1, and participants primed with an interdependent self mimicked significantly more than independent-primed participants. Whereas the first two studies temporarily activated self-construals through priming procedures, Study 3 compared the mimicking behaviors of participants who had chronic interdependent self-construals (Japanese) with participants who had chronic independent self-construals (Americans). Once again, we found the predicted pattern of mimicking, with Japanese imitating confederates' face-rubbing significantly more than Americans. Importantly, no participants in any of the three studies were aware of the mannerisms of the confederates, or were aware of their mimicry of these mannerisms, suggesting that mimicry was occurring nonconsciously. In combination, these studies provide strong and varied evidence that self-construal orientation, whether primed or chronic, affects nonconscious mimicry.

Implications for self-construal theory

While previous self-construal research has focused on the effects of self-construals on self/other-related cognition, motivation, emotion, decision-making, and information processing (Fiske, et al, 1998; Markus & Kitayama, 1991; Nisbett et al., 2001; Stapel & Koomen, 2001), the present findings are, to our knowledge, the first to demonstrate that different self-construal orientations can lead to meaningful differences in nonconscious *behaviors*. In the same manner that interdependent self-construals lead to an increased tendency to cognitively, emotionally, and perceptually assimilate others to the self (Markus & Kitayama, 1991; Stapel & Koomen, 2001), we have argued that such self-construals can also lead to the assimilation of others' *behaviors* to the self nonconsciously, such that interdependent individuals tend to directly imitate or mimic others' habitual movements. Conversely, in the same way that independent self-construals are associated with the *exclusion* of others from the self, we have argued that when the independent self is active, nonconscious mimicry of others will be inhibited, such that independent individuals are actively excluding others' behaviors from the self.

In fact, the results from Studies 1 and 2 indicate that there is an inhibiting effect of independent self-construal on mimicry. This finding is in line with research on independent self activation and automatic behavior. For example, Dijksterhuis and van

Knippenberg (2000) found that increasing self-awareness by placing participants in front of a mirror inhibited the automatic behavioral assimilation of stereotype primes. Furthermore, recent research has shown that priming an individual's personal self renders self-relevant attitudes and personal values more accessible (Holland, Verplanken, van Knippenberg, & Dijksterhuis, 2002) and enhances their impact on the participant's choices and behavior (Verplanken & Holland, 2002). Thus it seems that personal self activation leads one to behave more according to internal standards and be less influenced by environmental stimuli.

It seems possible that self-construal orientation is influencing differences in nonconscious mimicry in at least two ways. First, different self-construals involve differences in information processing. A context-independent processing style tends to lead to perceptual differentiation and a tendency to ignore contextual and background factors (Nisbett et al., 2001), which would likely lead one to increased attention on the self and less on others; thus, fewer mannerisms of others would be observed, decreasing the likelihood of mimicry. In contrast, a processing style that is context dependent and involves assimilation would subsequently lead to behavioral assimilation, since more attention is paid to the contextual environment and changes within it, making mannerisms more noticeable or more likely to be mimicked. Second, the fact that an interdependent self-construal is associated with greater concern with relationships and interpersonal harmony indicates that such individuals may also be implicitly taking the perspective of others more, or implicitly conforming to others' behaviors in order to facilitate interactions. However, central to both a cognitive and motivational explanation is the tendency to assimilate behavior versus differentiate behavior. Further research is needed to clarify the extent to which both of these processes are occurring.

Implications for research on nonconscious mimicry

Mimicry has been shown to occur even in the most minimal of circumstances (Chartrand & Bargh, 1999; Neumann & Strack, 2000). Evidence obtained in Studies 1 and 2 supports this assessment. In both studies, non-primed participants mimicked more than participants primed with an independent self-construal, suggesting that there seems to be some *default* amount of mimicry that tends to occur naturally and automatically in social situations. The finding that these non-primed Western participants do mimic the

behavior of a confederate, which is consistent with the original Chartrand and Bargh (1999) research, suggests that there is an interplay between chronic and situational determinants of self-construal orientation. The results from all three studies suggest that mimicry can be either inhibited or exacerbated depending on one's active self-construal orientation. Thus, while mimicry may indeed be a default, automatic, and unmediated behavior in certain circumstances, other circumstances can trigger various goals or differential cognitive orientations, which can alter the extent to which individuals mimic others.

Compared to people with independent self-construals, people with active interdependent self-construals are more attentive to and inclusive toward others, and more concerned with positive relationships and social interactions. Recent research has also demonstrated that East Asians are more concerned with conforming to the situational norms and decisions of others than are Westerners (Iyengar & Leppar, 1999; Kim & Markus, 1999). Thus, the fact that they mimicked behaviors of others, one additional type of conformity, is a logical extension of previous research. The present research is also consistent with other recent research on the moderators of mimicry. In addition to self-construals, recent research suggests that individuals with perspective-taking goals (Chartrand & Bargh, 1999, Study 3), affiliation goals (Lakin & Chartrand, in press), or individuals who are high in self-monitoring (Cheng & Chartrand, 2002) tend to mimic more than participants without these other-focused orientations.

Recent research has suggested that mimicry increases liking for the person who mimics and pro-social behavior, both of which are beneficial social consequences for the person who mimics (Chartrand & Bargh, 1999; van Baaren, Holland, Steenaert & van Knippenberg, 2002). A recent study by van Baaren, Holland, Kawakami and van Knippenberg (2002) has found evidence that mimicry not only has beneficial consequences for the mimicker, but also for other people. In these studies, participants who had been mimicked by a confederate were more willing to help another confederate or donate money to a charity compared to non-mimicked participants.

The fact that other-focused cognition increases mimicry is consistent with the recent argument that mimicry may be a nonconscious "tool" of some sort that individuals may instinctively use in order to facilitate interactions with others (Chartrand & Jefferis,

in press; Chartrand et al., in press; Cheng & Chartrand, 2002; Lakin & Chartrand, in press). In terms of the present research, this explanation suggests that people with active interdependent self-construals may nonconsciously take advantage of the functional, facilitative nature of mimicry by "using" it more often in social interactions, thereby increasing the chances that their relationships with others will go smoothly, and that they will be liked. Such may also be the case when individuals are focused on others in alternative ways; that is, when they have an affiliation goal, or if they are perspective-takers or are high in self-monitoring.

This interpretation is also consistent with the cross-cultural literature, where an abundance of evidence suggests that East Asians, as examples of individuals who tend to have chronic interdependent self-construals, are more concerned about positive relationships and harmonious interactions with others than are Westerners (Fiske, Kitayama, Markus, & Nisbett, 1998; Markus & Kitayama, 1991). The fact that mimicry occurs most often when individuals are temporarily or chronically concerned about getting along with others seems to point directly to a functional role that mimicry plays in social situations. In fact, in a recent review chapter, Chartrand et al. (in press) have argued that given the recent evidence that mimicry generally increases with motivations to get along well with others, it may in fact be a tool that "binds and bonds" people together, a type of "social glue" so to speak (see also Lakin, Jefferis, Cheng, & Chartrand, 2002). It may indeed be adaptive and beneficial in social interactions, tending to occur most often when harmonious interactions are most desired, and used most often by individuals who are most concerned with positive social exchanges.

Chapter 3: The Forest, the Trees, and the Chameleon: Context-Dependency and Mimicry[8]

Abstract-This article examines the relation between cognitive style and nonconscious behavioral mimicry. In Experiment 1, a correlation was observed between a measure of context-dependency of information processing (the Hidden Figures Test) and the amount of mimicry in a subsequent situation. In Experiment 2, context-dependency was experimentally manipulated, and results showed more mimicry in the session where a context-dependent processing style was induced compared to the session where a context-independent processing style was induced. Experiment 3 provided evidence for the bi-directionality of the relation between cognitive style and mimicry. Specifically, participants whose posture and behavior had been unobtrusively mimicked by an experimenter subsequently processed information in a more context-dependent manner than non-mimicked participants. Taken together, these results illustrate the subtle interplay between basic cognitive and behavioral processes.

Recent research has shown that people have a nonconscious tendency to mimic the behavior of their interaction partners, which has been termed "the chameleon effect" (Chartrand & Bargh, 1999). Behavioral mimicry has been attributed to an automatic perception-behavior link (Chartrand & Bargh, 1999; Dijksterhuis & Bargh, 2001; Prinz, 1990) whereby social perception (i.e., seeing someone engage in a behavior) automatically leads to behavior (i.e., engaging in the perceived behavior).

Although the perception-behavior link is by definition a passive, automatic process, experimental studies have uncovered individual differences in the extent to which the perception of behavior leads to the enactment of the perceived behavior (Chartrand & Bargh, 1999, Study 3; Cheng & Chartrand, 2002; Lakin & Chartrand, 2002; Van Baaren, Maddux, Chartrand, de Bouter, & Van Knippenberg, 2002). For instance, those high in perspective-taking nonconsciously mimic the mannerisms of interaction partners more than do low perspective-takers. In addition, high self-monitors, who rely more on the behavior of others to guide their own behavior, have been shown to mimic

[8] This chapter is based on: Van Baaren, R.B., Horgan, T.G., Dijkmans, M., & Chartrand, T.L. The forest, the trees, and the chameleon: context-dependency and mimicry.

those in power more than low self-monitors (Cheng & Chartrand, 2002). Moreover, more mimicry is observed among individuals with an affiliation goal active, compared to those without such a goal (Chartrand, Maddux, & Lakin, in press; Lakin & Chartrand, 2002). Finally, Van Baaren et al. (2002) found that individuals who tend to define, or are primed to define, the self in a more interdependent fashion are more likely to mimic others than are those who tend to define, or are primed to define, the self in a more independent fashion.

Why interdependent self-construals lead to greater behavioral mimicry is not yet known. It may be that individuals with an interdependent self-construal are more perceptually attuned to nonverbal behaviors because their relationships with others are defined in terms of the contextual (i.e., nonverbal) cues they pick up from these individuals. This suggests that differences in context-dependency (i.e., reliance on contextual cues) may be related to differences in behavioral mimicry. This was investigated in the present set of studies by exploring the relationship between mimicry and cognitive style.

Cognitive Style

Cognitive styles concern the ways that individuals consistently perceive, organize, and respond to stimuli – in other words, the "form" or "process" rather than the "content" or "level" of cognition (Shipman & Shipman, 1985; Witkin & Goodenough, 1977). One of the most extensively investigated individual differences in cognitive style has been that of field dependence versus field independence. Witkin, Goodenough, and Oltman (1979) have argued that individuals with a field-dependent cognitive style tend to rely more on "external referents" (i.e., contextual cues) than do field-independent individuals across of variety of domains, from perception to interpersonal behavior.

In the field of visual perception, field-dependency involves integrating objects and their respective contexts, whereas field independence involves differentiating between the focal object and its field/context. Field dependency can be measured on several tasks, for example the Hidden Figures Test or the Rod and Frame Test. On the Embedded Figures Task (EFT), the goal is to locate simple geometric figures that are embedded within more complex and distracting visual backgrounds (Witkin, Oltman,

Raskin, & Karp, 1971). Field-dependent individuals tend to be more dependent on or influenced by the organization of the visual field as given. They therefore have a more difficult time correctly locating simple figures than do field-independent individuals, who tend to overcome the structure of the visual field and perceive simple figures as more disconnected from their context (Witkin, Moore, Goodenough, & Cox, 1977; Witkin & Goodenough, 1981).

Another test of context-dependency is the Rod-and-Frame Test (RFT). In this test, a rod is placed in a rectangular box and individuals must determine whether the rod is vertically oriented (see Witkin & Goodenough, 1981). With respect to judgments concerning verticality, those of field-dependent individuals reveal a greater reliance on the external visual field (i.e., contextual cues regarding the orientation of the box), whereas those of field-independent individuals reveal a greater reliance on the self (Witkin & Goodenough, 1981).

Cognitive Style and Interconnectedness

One explanation for field-dependent individuals' greater context-dependency or reliance on contextual cues is that they tend to perceive themselves as less differentiated from or more psychologically connected to their context, whether that context is visual patterns or other people (Witkin & Goodenough, 1981; Witkin et al., 1979). Indeed, research has shown that the extent to which individuals feel connected to others, whether chronically or temporarily, leads to differences in their reliance on contextual cues as a basis for perception (Ji, Peng, & Nisbett, 2000; Kuhnen, Hannover, & Schubert, 2001). For example, Kuhnen et al. (2001) found that individuals were less influenced by the dominant organization of the visual field (i.e., more field independent) on an embedded figures task when their independent as opposed to independent self-construal had been experimentally primed. Stated differently, an independent self-construal led individuals to perceive simple figures as more disconnected from their context. In addition, recent cross-cultural research has shown that individuals from a collectivist culture rely more on contextual cues in their judgments concerning verticality on the RFT than do individuals from a more individualistic culture (Ji, Peng, & Nisbett, 2000).

Cognitive Style and Interpersonal Interactions

Besides the relation between context-dependency and interpersonal

connectedness, there also seems to be a relation between context-dependency and the interaction with other people. With respect to interpersonal behavior, relative to field-independent individuals, field-dependent individuals show more attentiveness to social cues (Fritz, 1971; Fitzgibbons, Goldberger, & Eagel, 1965), higher levels of social conformity (Nedd & Marsh, 1978), and a greater tendency to be influenced by others (e.g., Gul, Huang, & Subramaniam, 1992). It is therefore conceivable that a greater reliance on contextual cues will also be associated with more nonconscious mimicry of the behavior of one's interaction partner. When we have a cognitive processing style that consists of a general tendency to differentiate, it is likely that our behavior will also reflect this context-independency – that is, we will be less likely to nonconsciously take on the behaviors of our interaction partners. Conversely, when our processing style reflects a general tendency to assimilate objects and background, we should be more likely to do what others do. Therefore we expect that greater context-dependency in information-processing style (i.e., field dependence) will be related to more behavioral mimicry.

Bi-Directional Relation Between Cognitive Style and Mimicry

Based on studies that show profound effects of mimicry on the way one perceives and feels toward others, the relation between context dependency and mimicry may be bi-directional. Not only does the interconnectedness to others influence mimicry (van Baaren et al., 2002), but there is also evidence that mimicry influences one's relationships with other people, thereby suggesting bi-directional causality. For example, in Chartrand and Bargh (1999, Study 2), confederates either mimicked or did not mimic the postures and mannerisms of the participants. It was found that participants liked the confederate more if they had been mimicked by her. They also reported that the interaction went more smoothly in the mimicry compared to the non-mimicry condition. Furthermore, in a recent study by van Baaren, Holland, and van Knippenberg (2002), participants who had been mimicked by an experimenter felt closer to "other people in general" than non-mimicked participants, as measured on a modified Inclusion of the Other in the Self-Scale (Aron, Aron, & Smollan, 1992). Mimicry thus seems to influence our interconnectedness with and feelings toward others. Given the relation between interconnectedness and processing style, the question arises whether mimicry can

influence processing style. Specifically, does being mimicked induce a more context-dependent processing style compared to not being mimicked?

If we obtain evidence for a bi-directional relationship between context-dependency and mimicry, this would illustrate the subtle way in which basic cognitive and behavioral processes mutually activate each other. By showing that a processing style that involves assimilation of object and context also leads to behavioral assimilation, and behavioral assimilation in turn activates an assimilative processing style we would demonstrate how implicit behavioral styles and implicit cognitive styles automatically run in parallel.

The Present Research

In the present experiments we investigated the proposed link between processing style and mimicry. Experiment 1 investigated the proposed link between information-processing style and nonconscious behavioral mimicry. Specifically, participants completed the Hidden Figures Test and then watched a videotape of a target performing various tasks. It was predicted that greater context-dependency in information-processing style (i.e., field dependence) on the HFT would be related to a greater tendency to mimic the nonverbal behavior of the target. In Experiment 2, processing style was induced by means of tasks that either (a) forced the participant to focus on objects independent of their respective contexts or (b) induced a more context-dependent information processing style. It was predicted that participants would mimic a confederate to a lesser extent when a context-independent (relative to context-dependent) processing style was induced. In Experiment 3, we predicted that participants whose behavior had been unobtrusively mimicked by an experimenter would subsequently process information in a more context-dependent manner that participants who had not been mimicked.

Experiment 1

Overview

The goal of this study was to examine how individual differences in information-processing style (i.e., cognitive style) are related to individual differences in the tendency to mimic the nonverbal behavior of others (i.e., behavioral mimicry). Participants were first given the Hidden Figures Test (HFT; French, Ekstrom, & Price, 1963), a measure of individual differences in cognitive style (i.e., field dependent vs. field independent).

Participants then watched a videotape of a target who was touching her face, moving her lip and shaking her foot while performing various clerical tasks, and they were required to memorize the order in which she did those tasks. Participants were surreptitiously videotaped as they watched the target so that their face-touching, lip-biting, and foot-shaking could later be coded. The extent to which participants mimicked the target's nonverbal behaviors was correlated with their scores on the HFT, with lower HFT scores (i.e., greater field dependence) predicted to be related to more behavioral mimicry.

Method

Participants

Fifty-five (24 female, 31 male) students enrolled in an introductory psychology course at a large Midwestern university participated in the study in partial fulfillment of a course requirement. Data from 5 participants were excluded from subsequent analyses for the following reasons: (a) the videotaping equipment malfunctioned during the study for 2 students, (b) 2 students did not want their videotapes coded, (c) and 1 student failed to follow instructions. Although no systematic sociodemographic data other than gender were collected, most participants were Caucasian and were freshmen or sophomores from a wide variety of majors within the University.

Measures and Materials

HFT. The Hidden Figures Test (HFT) (French et al., 1963) was used to measure participants' cognitive style. The HFT requires individuals to find simple geometric line figures that are embedded within more complex visual backgrounds. The HFT is divided into two parts, and individuals are given 10 minutes to complete each part. Each part shows 5 separate simple figures, numbered 1 to 5, in a row at the top of the page, and 16 separate complex patterns below them. Participants must determine which of the simple figures shown at the top of the page is embedded in each of the 16 complex patterns. To illustrate, if a participant thought that simple figure 3 was in complex pattern 1, then he/she would mark 3 on his/her answer sheet. The total number of correct simple figures found, combining parts 1 and 2, represents a person's final score on the HFT. A field-independent cognitive style is inferred from higher HFT scores (i.e., greater speed and accuracy in correctly finding simple figures), and a field-dependent cognitive style from lower HFT scores. The mean, standard deviation, and range of HFT scores were as

follows: M = 9.56, SD = 5.97, range = 1 - 28.

Stimulus Tape. As part of the cover story, participants were asked to memorize the order in which a target performed various tasks. An 8-minute videotape was used that shows a college-aged Caucasian female performing four clerical tasks – working on a computer, reading and highlighting a textbook, answering a telephone, and stapling papers together. The task was easy to do and not cognitively taxing. Because we were interested in measuring behavioral mimicry on the part of participants, the female also displays 3 specific nonverbal behaviors while performing her tasks, namely face-touching, lip-moving and foot-shaking. For example, at one point in the tape, viewers see the female sitting on a chair, staring at a computer monitor, and using her right hand to move a "mouse" around on a "mouse pad," as if she is searching for something on the computer screen. While she is doing this, she is also "moving her lip" by pulling her bottom lip back with her top lip, gently touching her chin with her left hand, and shaking her right foot back and forth.

Procedure

Each participant completed the study individually. Participants were told that the study concerned the relationship between their cognitive style, memory, and personality style. After signing the consent form, participants were taken to a table in the laboratory room where they read the instructions for the HFT, which were self-explanatory. When the participant indicated that he/she understood the instructions for taking the HFT, the experimenter gave him/her 10 minutes to complete each part of the test.

Next, the experimenter had the participant sit in a chair that was facing a TV monitor in the lab room. Participants were told that for the second part of the study they would watch an 8-minute videotape of a female performing various clerical tasks. It was explained to participants that they should watch the female and make a mental note of what she does and when she does it because afterwards they were going to be asked to recall the order in which she carried out her tasks. When the participant indicated that he/she understood the memory-task instructions, the experimenter left the lab room to go play the videotape, which the participant was told was in a VCR in the adjoining room. While in the adjoining room, the experimenter began videotaping the participant by turning on the 4 hidden cameras in the lab room, and then played the stimulus tape of the

target. The experimenter returned to the participant ostensibly to check on whether the videotape was playing and left the lab room as soon as the target appeared on the TV monitor.

The experimenter turned off the hidden cameras and stopped the VCR when the stimulus tape was over. The experimenter returned to the lab room and had the participant take a seat at the table again. Participants were given a sheet of paper, which had the words task 1 through 8 listed on it, and they were told to write down all the tasks they remember the female doing in the tape. Participants were given up to 10 minutes to complete the memory task.

At the conclusion of the study, the experimenter went through a "funnel debriefing" (see Bargh & Chartrand, 2000) in order to determine whether participants were aware of being videotaped during the memory task, and if so, why. After learning that they had been videotaped, two participants reported being suspicious about being videotaped (none beforehand), but neither understood why this was done. After the "funnel debriefing," participants were fully debriefed, asked to sign a "video release" consent form, thanked, and then dismissed by the experimenter.

Results and Discussion

Interjudge Reliability

Two independent judges rated the proportion of time each participant spent touching their face, moving their lip, and shaking their foot. This was done by dividing the total amount of time spent performing each of the nonverbal behaviors by the total amount of time spent watching the entire stimulus tape. For instance, if a participant touched her face a total of 117 s, bit her lip a total of 10 s, and shook her foot a total of 200 s while watching the stimulus tape for 514 s, then she would have received a face-touching score of .23, a lip-biting score of .02, and a foot-shaking score of .39. Interjudge reliability was high for each nonverbal behavior: face-touching, r (48) = .96.; lip-biting, r (48) = .90; foot-shaking, r = .94. Consequently, judges' ratings for each of the 3 nonverbal behaviors were averaged. Next, for each participant, we created a single index of the proportion of time spent mimicking the stimulus person by averaging these 3 ratings (i.e., face-touching, lip-biting, foot-shaking). The mean, standard deviation, and range of the mimicry scores were as follows: M = .098, SD = .087, range = .00 - .33.

Mimicry and Cognitive Style

To examine the relationship between cognitive style and behavioral mimicry, participants' HFT scores were correlated (Pearson r) with their mimicry scores. As predicted, there was a negative relation, r (50) = - .28, p = .05, indicating that greater field-dependence in cognitive style was associated with more behavioral mimicry. In short, the more participants were influenced by the organization of the visual field when searching for simple figures embedded within more complex backgrounds - and thus were either slower or less accurate at finding these simple figures (i.e., lower HFT scores) - the more likely they were to be non-consciously influenced by the target's nonverbal behavior (i.e., they were more likely to mimic her face-touching, lip-biting, and foot-shaking). This is evidence that chronic individual differences at the perceptual, information-processing level, in terms of one being typically more (field dependent) versus less (field independent) influenced by contextual cues, are related to individual differences at the behavioral level, in terms of one's tendency to mimic the nonverbal behavior of another person.

However, a correlation does not provide definite answers on causality, therefore processing style needed to be experimentally manipulated in order to systematically investigate its hypothesized moderation of mimicry. As the work by Kuhnen and colleagues (Kuhnen et al, 2001; Kuhnen & Oyserman, 2002) has shown, these processing styles co-exist within humans and can be experimentally primed. In Experiment 2, we primed context-dependency and assessed its effects on nonconscious behavioral imitation.

Experiment 2

Method

Overview

Participants worked on several tasks in two different sessions. In one session the tasks induced a context-dependent information processing style, and in the other session the tasks induced a context-independent information processing style. In both sessions, the experimenter rubbed her face several times a minute. Participants were videotaped and two judges coded their behaviors to examine whether participants mimicked the

behavior of the confederates. After these two sessions, participants consecutively received a memory task and mood measure.

Participants and design

Fifty undergraduate students from the University of Nijmegen (35 women and 15 men) were randomly assigned to the conditions and paid € 2 ($ 2) for their participation. The experiment had a 2 (Focus: dependent vs. independent) x 2 (Order: dependent first vs. independent first) mixed design, with Focus manipulated within subjects.

Procedure

Upon arrival at the laboratory, participants were randomly assigned to one of the Order conditions and led into a room by the experimenter and seated in such a way that they were completely visible to a camera concealed in a fire detector attached to the ceiling. The participant's chair half-faced the experimenter. After seating the participant, the experimenter left the room in order to turn on the hidden camera, returned and gave instructions. She explained that the participant would be given four tasks.

In the context-independent session, two tasks were developed to induce a context-independent information processing style. The first of these tasks was a letter-search task in which participant had to detect a target letter, which was printed only once on a sheet filled with other letters. In all five trials, the experimenter told the participant what letter to look for. As in the hidden figure task (Witkin, 1957), participants have to look for a specific shape in a larger collection of shapes.

The second task to induce an independent processing style was a map reading task. In this task, participants had to look for a specific street on the city maps of four European capitals (London, Rome, Madrid and Amsterdam). This task was based on a task developed by Friedman, Fishbach, Förster and Werth (2002) in which participants were presented with a state map and either had to focus on a city (narrow focus), or the entire state (broad focus). In study, focusing on a street was used to induce a context-independent processing style.

In the context-dependent session, two different tasks were presented. First, participants were presented with eight mazes, with an increasing difficulty, and were asked to draw a line from the entry to the exit. While working on the maze, participants have to relate the specific part of the maze they are looking at to the rest of the maze to

see whether one's attempt of getting out of the maze will be successful. In the task, it is necessary to look at the "big picture" in order to see whether one is successful, which results in a context-dependent processing style.

The second task consisted of five paintings by the Spanish artist Salvador (for example "The disappearance of the buste of Voltaire"). In these paintings, several smaller elements make up a bigger object or person. Participants were instructed to focus on the bigger picture and describe how all the elements make up the bigger picture. By doing this, participants are forced to relate the smaller items to each other and to process the painting in a context-dependent way. This manipulation resembles the one used by Kuhnen and Oyserman (2002), where participants had to indicate what big letter was made out of smaller letters.

The order of the sessions was counterbalanced between subjects. In both sessions, the experimenter rubbed her face twice each minute. After the two sessions, participants received a memory task designed by Kuhnen and Oyserman, which measures the context-dependency of information processing. In this task, participants are presented for 90 seconds with a sheet of paper consisting of 28 randomly located simple objects (e.g. house, rose, and piano) and instructed to look carefully. After the 90 seconds, the experimenter replaced the sheet with another piece of paper containing an empty grid and said: "Now I would like you to remember what you have just seen. Please try to remember what you have seen and where you have seen it. Write down in the cells of this grid the items you saw in the place you saw each one. If you can remember an item, but not where it was, you can write it down outside the grid. Please try to remember as many items and their positions as possible." The extent to which participants remember the location of an object is an indication of the contextualized memory of the object.

Finally, participants were given a mood measurement consisting of three bipolar 7-point scales (bad-good, sad-cheerful, gloomy-happy) and were instructed to indicate, without thinking for too long, how they felt at that moment. This task was included so we could check whether mood plays a role in the relation between context-dependency and mimicry. After the mood measurement, participants were thanked, paid and debriefed.

Results and discussion

Interjudge Reliability

The amount of face-rubbing on the videotapes was coded by a judge and 11 participants were randomly checked by a second, independent judge. The interjudge reliability was high: $r(11) = .86$. The amount of face-rubbing within each session was divided by the time the interaction lasted, reflecting the frequency of the face-rubbing per minute.

Mimicry

To examine the effect of context-dependency on mimicry, a 2 (Focus: dependent vs. independent) x 2 (Order: dependent first vs. independent first) analysis of variance with repeated measures on the first factor was executed on the behavior scores. A main effect of Focus was found, $F(1, 48) = 18.68$, $p < .01$. In the context-dependent session, participants mimicked the behavior of the experimenter more ($M = .51$) than in the context-independent session ($M = .33$). No main effect or interaction for Order was found (Fs < 1).

Mood and contextualized memory

Because Focus is a within subjects factor, it was not possible to look at the effects of context dependency on mood and memory within subjects. However, Order was manipulated between subjects making it possible to compare mood and memory of participants who received the context dependent tasks in the last session with participants who received the context independent tasks in the last session. No effects of Order were found on either mood, $F(1, 48) = 0.02$, $p = .88$ or the percentage recalled in the correct location on the memory measure, $F(1, 44)$[9] $= .02$, $p = 87$. There was, however, a significant correlation between the amount of mimicry and the percentage of items remembered in the correct location (contextualized memory), $r(44) = .34$, $p = .02$, indicating that, irrespective of the session, the more participants mimicked the face-rubbing of the experimenter, the more items they correctly remembered in the right location. No correlation between mimicry and the total number of objects recalled (decontextualized memory) was obtained, $r(44) = .02$, $p = .89$.

The present study successfully demonstrated that processing styles affect nonconscious mimicry. Using a within-subjects design, it was shown that a context-

[9] Four participants recalled only 1 item in the correct location and either did not understand the instructions properly, or did not try hard enough.

dependent processing style is associated with more mimicry than a context-independent processing style. Together with the results obtained by van Baaren et al. (2002), which indicated that an interdependent self-construal leads to more mimicry than a independent self-construal, these results provide support for the assumption that semantic and procedural priming effects have parallel effects, as would be expected on the basis of the Semantic-Procedural Interface model of the self (Kuhnen et al. 2001).

The obtained correlation between mimicry and the context-dependency measure replicates the correlation found in Experiment 1 and provides additional evidence for the relation between processing style and mimicry. The more participants had mimicked the experimenter, the more items they correctly recalled in their right location. Note that only the percentage in the right location, which is sensitive to the contextualized memory of the objects and not the total amount of objects recalled, correlated with mimicry. By manipulating processing style and assessing the amount of mimicry we found evidence that a greater context-dependency leads one to mimic more. However, that leaves unknown whether the relation between context-dependency and mimicry is bi-directional and the other causal direction also exists, or whether it is the only direction of causation. It is also plausible that independent of the effect of processing style on mimicry, behavioral synchrony by itself affects context dependency. In this case there would be a bi-directional link between the two. When one behaves similarly to ones interaction partner, this behavioral assimilation may activate the related processing style. This implies that being mimicked would induce a context-dependent processing style. In Experiment 3, we investigated this possibility.

Experiment 3

Method

Overview

Participants participated in an “advertisement study”, where they rated 10 advertisements on some irrelevant dimensions. During that task, following the procedure of Chartrand and Bargh (1999), an experimenter mimicked the posture of half the participants. The other participants were not mimicked. After this task, participants received the same memory task as was used in Experiment 2, in order to assess the context dependency of their information processing.

Participants and Design

Thirty-two participants were paid € 2 ($ 2) for their participation in this study. The experiment had a single factor (behavior: mimicry or non-mimicry) between subjects design.

Procedure

Upon arrival at the laboratory, participants were led into a room by the experimenter, and seated behind a desk. The participant's chair half-faced the experimenter. The experimenter, who was blind to the hypothesis, seated himself behind a desk and explained that the experiment was an advertisement study that tested the reaction of people to certain types of ads. The task of the participant was to look at each of the ten ads and take about 30 seconds to describe his or her feelings toward the specific ad. The experimenter wrote down the answers on the note-pad in front of him. During the task, the experimenter would mimic the posture of half the participants. Specifically, the orientation of the body (forward or backward), the position of the arms and the position of the legs were mimicked. The other participants were not mimicked.

After the advertisement task, participants were given the same memory task as was used in Experiment 2 (Kuhnen & Oyserman, 2002) that was designed to measure context-dependency. Again, participants are presented for 90 seconds with a sheet of paper consisting of 28 randomly located simple objects and instructed to look at it carefully for 90 seconds. Then, the experimenter replaced the sheet with a piece of paper containing an empty grid and instucted the participants to write down in the cells of this grid the items they saw, in the place they saw them. After this task, participants were thanked, paid, and debriefed.

Results and Discussion

To test the prediction that participants who were mimicked showed greater context-dependency in their information processing, the number of items correctly remembered was submitted to a single factor (Behavior: mimicry or control) between subjects analysis of variance. There was no main effect for the amount of items remembered, $F(1,30) = .03$, $p = .86$. As expected, however, a main effect for Behavior was found on the percentage of items remembered in the right location out of the total number remembered, $F(1,30) = 4.66$, $p < .04$. Participants who had been mimicked by the

experimenter remembered a higher percentage of objects in their right location (*M* = 50%) than the participants that had not been mimicked (*M* = 36 %).

The present study provided support for the hypothesized relation between mimicry and context-dependency. As expected, participants whose behavior had been mimicked remembered more items in their correct location than non-mimicked participants, whereas no difference between the groups was found on the total number of objects recalled. These data indicate that being mimicked induces a more context-dependent processing style than not being mimicked, and provide support for the bi-directionality of the relationship between context-dependency and mimicry.

General Discussion

Two studies examined the relationship between cognitive processing style and mimicry. In Experiment 1, a correlation was observed between the context-dependency of participants' cognitive processing style and the amount of mimicry in a subsequent situation. Specifically, a more context-independent processing style (better scores on the Hidden Figures Test) was related to less mimicry. Experiment 2 provided support for the assumption that processing style influences mimicry. In the session where a context-independent processing style was induced by having participants focus on objects irrespective of their context, more mimicry was observed relative to a context-dependent session, where participants were instructed to focus on objects in relation to their contexts. In Experiment 3, participants whose behavior had been mimicked subsequently processed information in a more context-dependent manner than participants whose behavior had not been mimicked.

Together these results demonstrate that a bi-directional relationship exists between context-dependency and mimicry. A processing style that involves assimilation of object and context also leads to behavioral assimilation, and behavioral assimilation in turn activates an assimilative processing style. The present data illustrate the subtle way in which basic cognitive and behavioral processes are capable of mutual activation. Cognitive style has consequences for the synchrony between our and other's behaviors, and synchrony between our and other's behaviors, in turn, affects our cognitive processing style. The bi-directionality of the relationship suggests a way in which our basic cognitive and behavioral processes correspond with one another. From a functional

perspective, it is useful to have both cognition and behavior operating in parallel instead of them being completely independent.

The Relation Between Cognitive Style, Self-Construal, And Mimicry

The observed effects are parallel to research on the relation between mimicry and semantic aspects of the self. Priming semantic aspects of the self moderates mimicry, such that an interdependent self is associated with more mimicry than an independent self (van Baaren et al., 2002). Furthermore, being mimicked leads to a construal of the self that is more interconnected with others (van Baaren et al., 2002). Stapel and Koomen (2001) also found that both semantic activation of self-construal ("I" versus "we" primes) and procedural activation ("differentiation" versus "integration" mindsets) moderate assimilation or contrast in social comparisons. In the context of the interface between semantic and procedural aspects of the self, the question remains how exactly those components are interconnected. Kuhnen et al. (2001) semantically activated self-construals and found corresponding shifts in processing style. It remains unknown whether the opposite also is true. Does procedural priming automatically activate the corresponding semantic aspects of the self? For example, would inducing a context-dependent processing style automatically make interdependent self-knowledge more accessible? It is also possible that there is a direct and unmediated effect of processing style on behavior. Future studies can address this question and extend our knowledge about the different aspects of the self and their interrelations.

Another important finding is the fact that participants in Experiment 1 mimicked the behaviors from a person on a TV screen (see also Lakin & Chartrand, in press). Mimicking someone on a monitor is obviously useless when one wants to fulfill certain social goals, for example being liked or being chosen as a possible mating partner. This suggests that obtaining concrete and immediate rewards is not *the* driving force behind our tendency to mimic our interaction partner's behavior. Mimicry occurs even in situations where it is absolutely impossible to interact with or influence other people: watching a TV screen. In combination with data showing that people mimic others even in the most minimal of social circumstances (Chartrand & Bargh, 1999; van Baaren et al, in press), this finding indicates that the tendency to mimic is a general tendency and not an intentional, strategic process. The present findings illustrate that very basic differences

in cognitive style are capable of moderating nonconscious behavioral mimicry and provide us with more insight into the processes underlying this intriguing interpersonal phenomenon.

Finally, it was shown that being mimicked or not affects our very basic cognitive processing. This suggests that mimicry may serve as a proprioceptive cue that influences self-regulatory processes. When we detect similarity between what we do and what we see (perception-behavior link), this subsequently leads us to process stimuli and others in a more interdependent manner. Conversely, when perception and action are different from each other, we process and react in an independent manner. Although speculative, it may be the case that a similarity between perception and action provides us with information about our interaction with the environment and the environment itself, parallel to a "mood as information" account (Schwarz, 1990; Schwarz & Bohner, 1996; Schwarz & Clore, 1996). Future studies can investigate this hypothesized self-regulatory aspect of mimicry. In conclusion, the present data suggest that mimicry is a basic and unintentional process that is connected to our general cognitive style, which in turn has a profound effect on cognition.

Chapter 4: Mimicry and pro-social behavior[10]

Abstract-Recent studies have shown that mimicry occurs unintentionally and even among strangers (Chartrand & Bargh, 1999). In the present studies we investigated the consequences of this automatic phenomenon in order to learn more about the adaptive function it serves. In three studies we consistently found that mimicry increases pro-social behavior. Participants who had been mimicked were more helpful and generous towards other people compared to participants who had not been mimicked. These beneficial consequences of mimicry were not restricted to the mimicker, but the pro-social behavior of the person who had been mimicked also occurred with other people. These results suggest that the effects of mimicry are not simply due to increased liking for the mimicker, but extend to a more pro-social orientation in general.

"When people are free to do as they please, they usually imitate each other."

- Demotivators© 2000 calendar

Not only when we are free to do as we please, but also when we operate on an automatic level, we mimic others. Recent research has shown that humans have a strong tendency to do what others do. But why do we mimic others? Several explanations for the adaptive function of mimicry have been proposed. From an evolutionary perspective, mimicry is thought to enhance safety, whereas from a social perspective, mimicry serves as a "social glue" that creates liking and bonds between people (Chartrand, Maddux & Lakin, in press; Dijksterhuis & Bargh, 2001; Dijksterhuis, Bargh & Miedema, 2000). Experimental evidence for this social perspective on the functionality of mimicry comes form a recent study, in which mimicry increased liking and rapport in dyadic interactions (Chartrand & Bargh, 1999). If mimicry is truly adaptive, it should also have beneficial consequences on a behavioral level. An additional question that arises is whether these observed effects of mimicry are restricted to the person who does the mimicry? In the present article we propose that being mimicked leads to a more pro-social orientation in

[10] This chapter is based on: Van Baaren, R.B., Holland, R.W., Kawakami, K., & Van Knippenberg, A. (in press). Mimicry and pro-social behavioral. *Psychological Science*.

general, from which not only the mimicker benefits, but also other people who interact with a mimicked person. If mimicry increases pro-social behavior, this would provide strong evidence for the assumption that it plays a vital role in social life.

By now, there is substantial evidence that humans mimic a wide range of behaviors. In addition to several speech-related behaviors such as accents (Giles & Powesland, 1975), tone of voice (Neumann & Strack 2000), pauses (Cappella & Planalp, 1981), rate of speech (Webb, 1969; 1972) and syntax (Levelt & Kelter, 1982), we also mimic postures, mannerisms (Chartrand & Bargh, 1999) and even moods (Neumann & Strack, 2000) and emotions (Hatfield, Cacioppo, & Rapson, 1994). This mimicry often occurs automatically. Chartrand & Bargh (1999) observed that participants in their experiment unconsciously took over the mannerism of a confederate, even though the confederate and the participant were not acquainted. Further evidence for the automaticity of mimicry comes from neuroscientific research on so-called “mirror neurons” (Gallese, Fadiga, Fogassi & Rizzolatti, 1996). This research shows that, within our brains, there is an intimate link between observing an action and performing the same action ourselves. The same areas in the brain that take part in performing a certain action are also activated when we merely perceive another person performing that specific action (Iacobini, Woods, Brass, Bekkering, Mazziotta & Rizzolatti, 1999).

Why do humans have this innate tendency to mimic? One way to examine this question is to look at the consequences of mimicry. It is hypothesized that mimicry, by increasing empathy, liking and rapport, plays an important role in social interactions (Chartrand, Maddux & Lakin, in press). Although several studies have found a relationship between mimicry and rapport and liking (e.g. Bavelas, Black, Chovil, Lemery & Mullet, 1988; La France, 1982; Maurer & Tindall, 1983), additional evidence for these hypothesized consequences of mimicry comes from an experiment by Chartrand & Bargh (1999). In their study, a confederate was instructed to take over the posture and mannerisms of half the participants. For example, if the participant was leaning forward and touching her face, the confederate was instructed do the same thing. The other half of the participants were not mimicked and care was taken that, apart from the mimicry, the confederate acted similarly in both conditions. Afterwards, participants were asked to rate both their liking for the confederate and the pleasantness of the interaction. The results

demonstrated that participants who had been mimicked by the confederate liked the confederate better and perceived the interaction as to run more smoothly than participants who had not been mimicked.

Besides increasing liking and rapport, mimicry should also have consequences at a behavioral level in order to be truly adaptive (Dijksterhuis & Bargh, 2001; Milner & Goodale, 1995). Preliminary evidence for the beneficial behavioral consequences of mimicry comes from a recent study by Van Baaren, Holland, Steenaert, and Van Knippenberg (in press), in which waitresses either verbally mimicked or did not verbally mimic their customers. Results indicated that waitresses received larger tips when they used the exact same words as their customer compared to a condition where they simply paraphrased the order of the guest.

The question remains, however, how diffuse or specific are these effects of mimicry? Does mimicry make a person only more pro-social towards the person who mimics, or does mimicry affect a more general pro-social orientation, which is not directed at a specific target? Recent studies by Van Baaren, Holland, and Van Knippenberg (2002) suggest that the latter process may be the case. Specifically, in their study, a confederate unobtrusively mimicked the posture and mannerism of half the participants and was instructed to not mimic the other half. Afterwards, participants received a modified Inclusion of the Other in the Self-Scale (Aron, Aron, & Smollan, 1992). The results indicated that participants who had been mimicked felt closer to "other people in general" than participants whose behavior had not been mimicked. If mimicry makes us feel closer to other people in general, it is conceivable that we will also behave more pro-socially in general, thereby highlighting the important role it plays in creating and sustaining human groups.

To investigate whether people other than the mimicker benefit from a more pro-social orientation by those who are mimicked, three studies were conducted, which utilized a procedure by Chartrand & Bargh (1999). Specifically, in each study, a confederate mimicked the posture and mannerism of half the participants, while conducting an irrelevant marketing study. In Experiment 1, we first examined whether mimicry makes people more helpful towards the mimicker. In Experiment 2 and 3 we examined whether mimicry increases helpfulness towards people other than the person

who did the mimicry. Based on the assumption that mimicry makes people more pro-social in general it was hypothesized that participants who have been mimicked will not only be more helpful towards the confederate who mimicked them, but also to people who were not involved in the mimicry.

Experiment 1

Method

Overview. An experimenter was instructed to mimic the posture and mannerisms of half the participants and not mimic the other half, while working on an irrelevant marketing study. After this task, she was required to leave the room and re-enter after a few seconds and drop a number of pens. Whether or not the participant helped the experimenter pick up the pens served as the dependent variable.

Participants and design. Seventeen undergraduate students from the University of Nijmegen (9 men and 8 women) were randomly assigned to the conditions and paid €2.- ($ 2.-) for their participation. The experiment had a single factor (Behavior: mimicry vs. non-mimicry) between-subjects design.

Procedure. Upon arrival at the laboratory, participants were led into a room by the experimenter, and seated behind a desk so that the participant's chair half-faced the experimenter's chair. The experimenter seated herself behind a desk and explained that the experiment was a marketing study that examined the reactions of people to certain types of ads. The task of the participant was to look at each of the ten ads and to take about 30 seconds to verbally describe his or her opinion toward the specific ad and to rate the advertisements on a seven-point scale ranging from "bad" to "good." The experimenter wrote down the answers on the note-pad in front of her. During the task, the experimenter would mimic the posture of half the participants by taking their body orientation (e.g. leaning forward), the position of their arms, and the position of their legs. In the non-mimicry condition, the experimenter did not mimic the participants. With the exception of the behavioral mimicry, the experimenter was trained to ensure that the rest of her behavior was the same across conditions. The interaction lasted for approximately six minutes.

After the "marketing study," the experimenter informed participants that they would receive another, unrelated task as soon as she retrieved material from an adjacent

room. She left the experimental room and after thirty seconds re-entered the room. She "accidentally" dropped six pens that were on top of several papers upon passing the participant (see Macrae & Johnston, 1998). When the participant did not pick the pens up within ten seconds, the experimenter picked up the pens by herself.

Results and discussion

To test the prediction that mimicry would increase pro-social behavior, whether participants helped the experimenter pick up the pens or not was subjected to a Chi-Square test. The results indicated that participants in the mimicry condition picked up the pens more often (100 %) than participants in the non-mimicry condition (33 %), $\chi 2 = 8.24$, $p < .01$.

The first experiment confirmed the hypothesis that mimicry increases helpfulness. Participants whose behavior had been mimicked by a confederate were more likely to help her pick up pens than participants who had not been mimicked. These results are a conceptual replication of the results found by Van Baaren et al. (in press) and provide further evidence that mimicry promotes pro-social behavior.

Based on the finding that mimicry induces a greater closeness to other people in general, we further expected that other people may also benefit from the increased pro-social orientation of a mimicked individual. To test this hypothesis, the dependent variable in Experiment 2 was not the helpfulness towards the confederate, who had or had not mimicked the participant, but the helpfulness towards another person. If mimicry leads to a pro-social orientation in general, mimicked participants should also be more helpful to someone other than the mimicker.

Experiment 2

Method

Overview. An experimenter mimicked the posture and mannerisms of half the participants and did not mimic the other half, while working on an irrelevant marketing study. Next, participants were asked to participate in another unrelated study with a different experimenter. After the experimenter left the room, a new experimenter entered the room and "accidentally" dropped a number of pens. The number of participants who helped the new experimenter pick up pens was the dependent variable

Participants and design. Forty-two undergraduate students from the University of Nijmegen (11 men and 31 women) were randomly assigned to the conditions and paid €2.- for their participation. The experiment had a single factor (Behavior: mimicry vs. non-mimicry) between-subjects design.

Procedure. The procedure for the first part was identical to Experiment 1. Again participants were told that they would participate in a "marketing study", in which they would describe and rate ten advertisements. During the task, the experimenter mimicked the posture of half the participants by taking over the body, arm and leg orientation. In the non-mimicry condition, the experimenter did not mimic the participants. Again the interaction lasted for approximately six minutes.

After the "marketing study," the experimenter explained the participants that a new experimenter would come and give them a second, unrelated task. Shortly after she had left the room a new experimenter entered the room, and "accidentally" dropped the pens she was carrying while carrying six pens on top of several papers upon passing the participant. Again, if the participant did not pick up the pens within ten seconds, the experimenter picked up the pens by herself.

Results

To test the prediction that mimicry would increase pro-social behavior, the number of participants who helped the new experimenter pick up the pens was subjected to a Chi-Square test. The results indicated that participants in the mimicry condition (84 %) picked up the pens more often than participants in the non-mimicry condition (48 %), $\chi 2 = 6.00$, $p < .02$.

Experiment 2 confirmed the hypothesis that people other than the mimicker can profit from the pro-social behavior of a mimicked individual. Participants whose behavior had been mimicked gave significantly more money to a charity than participants who had not been mimicked. These results suggest that mimicry can produce a more diffuse pro-social orientation that transfers to people in general.

One type of behavior that is especially dependent on the pro-social orientation of a person is donating behavior. If mimicry increases a general pro-social orientation, people should donate more money to a charity after they have been mimicked compared to when they have not been mimicked. In Experiment 3, we examined this hypothesis. In

this study, the dependent variable was not the helpfulness towards a specific and present person, but the amount of money donated to an organization that visits and entertains seriously ill children in hospitals (CliniClowns). We also manipulated whether the same or a new experimenter would point out the possibility to donate money. It is conceivable that a new experimenter, who calls attention to the CliniClowns, is less effective in transferring the pro-social orientation developed in the interaction to the donation situation than the same experimenter.

Experiment 3

Method

Overview. An experimenter mimicked the posture and mannerisms of half the participants and did not mimic the other half, while working on an irrelevant marketing study. Next, for half the participants, the same experimenter asked the participants to participate in a study for the CliniClowns. For the other half of the participants, a new experimenter made this request. In this study participants were given the opportunity to donate money to the charity.

Participants and design. Forty-one[11] undergraduate students from the University of Nijmegen (7 men and 34 women) were randomly assigned to the four conditions and paid €2.- for their participation. The experiment had a 2 (Behavior: mimicry vs. non-mimicry) X 2 (Experimenter: same vs. new) between-subjects design.

Procedure. The procedure for the first part was identical to Experiment 1 and Experiment 2. Again participants were told that they would participate in a "marketing study", in which they would describe and rate ten advertisements. During the task, the experimenter mimicked the posture of half the participants by taking over the body, arm and leg orientation. In the non-mimicry condition, the experimenter did not mimic the participants. Again the interaction lasted for approximately six minutes.

After this "marketing study," the experimenter told the participants that this task was finished and that they would work on a second unrelated task. The experimenter explained that he would already pay the participants for their participation and that they were free to go after finishing the second task. He gave the participants four fifty cent

[11] Three participants were excluded form the analyses because they were visiting students, who were not native Dutch speakers.

coins (i.e., €2.- in total). Half the participants received the instructions for the second task from the same experimenter. The other half of the received the instructions from a new experimenter. The experimenter (the same one or the new one) seated the participant behind a desk in the corner of the room. On the desk were a collection-box and a second box. The experimenter then said: “The University of Nijmegen is conducting research for the CliniClowns. After filling out this form, you can donate money, if you want to. When the questionnaire is completed, please place it in this box.” After these instructions, the experimenter left the room. Participants were alone in the room and were not asked to identify themselves on the questionnaire. Furthermore, both the collection box and the second box were locked with a padlock to foster the participants’ impression that their data would be treated anonymously. To make the coverstory more credible, the questionnaire consisted of four filler questions regarding the CliniClowns that were not relevant to the present hypotheses.

Results and discussion

To test the prediction that mimicry would increase pro-social behavior, the number of participants who donated money to the charity was subjected to a Chi-Square test. The results indicated that participants in the mimicry condition (76 %) donated money more often than participants in the non-mimicry condition (43 %), $\chi 2 = 4.84$, $p < .03$.

In addition the amount of money donated to the CliniClowns was subjected to a 2 (Behavior: mimicry vs. non-mimicry) X 2 (Experimenter: same vs. new) analysis of variance. The only significant effect was a main effect for Behavior, $F(1,37) = 4.26$, $p < .05$. The results indicate that participants in the mimicry condition donated more money (M = €.79) than participants in the non-mimicry condition (M = € .38). Furthermore, the Behavior X Experimenter interaction was not significant, $F(1,37) = 1.52$, $p = .23$. Participants in the new experimenter condition gave more money to the CliniClowns in the mimicry condition (M = € .72) than in the non-mimicry condition (M = € .56). The participants in the same experimenter condition also gave more money in the mimicry condition (M = € .91) than in the non-mimicry condition (M = € .25).

The present study successfully demonstrated that mimicry increases a general pro-social orientation. Mimicked participant were donated more money to a charity, which

indicates that not only the mimicker benefits from the pro-social consequences of mimicry, but also other people, even when they were not present when the person was being mimicked.

General Discussion

The present studies provided strong evidence that mimicry increases pro-social behavior and that these behavioral consequences of mimicry are not restricted to the mimicker. Other people can also benefit from the more pro-social orientation of the mimicked person. In Experiment 1, participants whose behavior had been mimicked by an experimenter were more helpful when she "accidentally" dropped pens on the floor compared to the non-mimicked participants. In Experiment 2, participants who had been mimicked by a first experimenter, were more helpful towards a second experimenter who "accidentally" dropped her pens. Finally, in Experiment 3, participants in the mimicry condition donated more money to a charity than in the non-mimicry condition. Mimicry led to enhanced donations irrespective of whether participants were asked by the experimenter who had mimicked them or by a new experimenter. Taken together, these results illustrate the important role mimicry plays in creating pro-social behavior.

Mimicry may have adaptational value, enhancing the chances of successful procreation of those members of a species who adopt this specific behavior. Most of the arguments in favor of the survival value of mimicry (specifically the behavioral imitation of conspecifics) are, however, mainly hypothetical. First, it has been argued that mimicry fosters safety (e.g., Dijksterhuis et al. 2000). Individuals behaving in ways similar to their fellow group members may for instance reduce the risk of falling prey to predators. This may be true for gnus and sardines, but it seems unlikely that this mechanism extends to humans mimicking the postures and mannerisms of their interaction partners. Secondly, imitating others may be a potent mechanism in learning and acculturation. There is some observational evidence that mimicry may indeed facilitate transmission of cultural behaviors in higher primates (De Waal, 2002). Thirdly, mimicry may function as a social glue, holding the group together. This way mimicry may foster the survival of (primate) groups and, particularly, the survival and procreation of individuals who through their imitative behavior manage to stay within the group's protective and nurturing environment.

The present finding that mimicry enhances pro-social behavior suggests that it serves to strengthen social bonds. When you mimic someone else, you increase the chances of that person behaving more pro-socially towards you. You may gain access to more resources, and the other person may be more inclined to lend a helping hand, or even help you raise your children. Thus, these behavioral consequences provide suggestive support for evolutionary explanation, because in the end, natural selection works on a behavioral level (Milner & Goodale, 1995).

An issue that needs further investigation is the potential mediation of this effect. It is conceivable that a greater closeness to “other people in general” (Van Baaren, Holland & Van Knippenberg, 2002) plays a mediating role in the increase of pro-social behavior towards others than the mimicker. Through its increased closeness, mimicry may induce a greater focus on others in general and make people more attentive to the other. It is equally possible, however, that these are all parallel, independent and unmediated effects of mimicry. Future studies on this issue may shed more light on the underlying processes.

Experiment 3 showed that mimicry stimulated donating behavior. Although we all need the help of others, there are numerous people and institutions that are especially dependent on the pro-social behavior of others, for example charities. These results may have important consequences for people, who are involved in the fundraising for those institutions, as it may be a good idea to use mimicry in order to raise more money.

In conclusion, the current research has provided additional evidence of the functionality of mimicry. In studying its consequences, we learn more about the adaptive role mimicry plays in our daily lives. Doing what others do may be beneficial in such a diverse array of social situations as: job interviews, romantic affairs, networking and the selling of products. When you take the beneficial role mimicry plays in social life into account, it is no wonder that people imitate each other, even when they are free to do as they please.

Chapter 5: Mimicry for Money: Behavioral consequences of imitation[12]

Abstract-Two experiments investigated the idea that mimicry leads to pro-social behavior. It was hypothesized that mimicking the verbal behavior of customers would increase the size of tips. In Experiment 1, a waitress either mimicked half her customers by literally repeating their order or did not mimicked her customers. It was found that she received significantly larger tips when she mimicked her customers than when she did not. In Experiment 2, in addition to a mimicry- and non-mimicry condition, a baseline condition was included in which the average tip was assessed prior to the experiment. The results indicated that, compared to the baseline, mimicry leads to larger tips. These results demonstrate that mimicry can be advantageous for the imitator because it can make people more generous.

People have an automatic tendency to imitate others. As the saying goes: "monkey see, monkey do." One may wonder why monkeys and people imitate others. What is the function of mimicry? In the animal domain (e.g., gnus and mackerels), it is argued that mimicry helps to enhance safety (Dijksterhuis, Bargh, & Miedema, 2000). Among humans, it has been suggested that behavioral mimicry may enhance liking and strengthen the bonds between people (Chartrand & Bargh, 1999). Thus, some general benefits are assumed to ensue from mimicry. Although several studies have found a relationship between mimicry and rapport and liking (e.g. Bavelas, Black, Chovil, Lemery & Mullet, 1988; La France, 1982; Maurer & Tindall, 1983), to our knowledge no studies have experimentally investigated any concrete behavioral consequences of mimicry. In the present article, we argue that mimicry enhances pro-social behavior. Specifically, we aim to demonstrate that people being mimicked will respond more generously towards the person who mimics them. To experimentally test this proposal, we chose a real life restaurant setting. Does a waitress who literally repeats what her customers order receive a larger tip than a waitress who does not mimic her customers?

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[12] This chapter is based on: Van Baaren, R.B., Holland, R.W., Steenaert, B., & Van Knippenberg, A. (in press). Mimicry for money: Behavioral consequences of imitation. *Journal of Experimental Social Psychology.*

Research has shown that people automatically mimic others. This effect has been observed for a wide variety of behaviors (for a review, see Chartrand, Maddux, & Lakin, in press). One type of behavior that is especially susceptible to mimicry is speech. For instance, people mimic words (Bock, 1986; 1989), accents (Giles & Powesland, 1975), rate of speech (Webb, 1969; 1972), tone of voice (Neumann & Strack 2000), and syntax (Levelt & Kelter, 1982). Cappella & Planalp (1981) found that in dyadic conversations, people have a tendency to assimilate the way they speak, for example in rhythm, and pauses. Research has shown that, besides speech, people also mimic laughter (Young & Frey, 1966), facial expressions (Hsee, Hatfield, Carlson, & Chemtob, 1990), behaviors (Chartrand & Bargh, 1999), emotions (Hatfield, Cacioppo, & Rapson, 1994), and mood (Neumann & Strack, 2000).

Recently, Chartrand & Bargh (1999) demonstrated that behavioral mimicry occurs spontaneously even among strangers. In their first study, participants interacted with a confederate in two sessions. In one session, the confederate rubbed her face and in another session she shook her foot. Videotapes of the sessions show that participants mimicked the behavior of the confederate. When the confederate shook her foot, they shook their feet, and when the confederate rubbed her face, they also rubbed their face. In the debriefing, participants indicated that they were unaware of their mimicry. Thus, they unconsciously mimicked the behavior of the confederate. Chartrand and Bargh describe the occurrence of this unconscious mimicry as the “chameleon effect.” Like a chameleon our appearance changes to match the environment.

Mimicry probably serves several socially adaptive functions. It enhances rapport and liking among people (Bavelas, Black, Lemery, & Mullet, 1987), and helps to create bonds between individuals. To experimentally test the idea that mimicry increases liking, Chartrand & Bargh (1999) instructed a confederate to unobtrusively mimic the behaviors and postures of half the participants. For the other half of the participants, the confederate acted in exactly the same way, without the mimicry. Those participants who had been mimicked reported greater liking for the confederate and indicated that the interaction went more smoothly than participants who had not been mimicked.

Moreover, a recent study by Van Baaren, Holland, and Van Knippenberg (2002) demonstrated that mimicry also leads to a greater sense of interpersonal closeness. In

their study, the experimenter, who was ostensibly conducting a marketing study, unobtrusively mimicked the posture and behavioral mannerisms of participants or not. At the end of this study, participants filled out an interpersonal closeness scale (Aron, Aron, & Smollan, 1992). The results indicated that participants whose behavior had been mimicked felt closer to other people in general, than participants whose behavior had not been mimicked.

In combination, these studies suggest that mimicry increases both liking and interpersonal closeness. Besides feelings and cognition, mimicry may also have beneficial consequences at a behavioral level. Because mimicry is often described in terms of its adaptive value (e.g. Chartrand et al., in press; Dijksterhuis & Bargh, 2001), if mimicry enhances interpersonal closeness and liking, it seems plausible that mimicking people may also make them more benevolent towards the person who imitates them. The primary goal of the present studies is to investigate the behavioral consequences of mimicry. Does mimicry produce larger tips for waitresses?

Besides providing good food and service, several behaviors have been shown to increase the size of the tips that are given. Crusco & Wetzel (1984), for instance, had servers casually touch customers in a restaurant at the end of a meal when returning change to the table. The customers who had been touched left a larger tip, compared to customers who had not been touched. Other means of increasing tips include: greeting the customer and introducing oneself (Garrity & Degelman, 1990), writing “thank you” (Rind & Bordia, 1995), a helpful message (Rind & Strohmetz, 1999), or drawing a happy face (Rind & Bordia, 1996) on the checks. Squatting next to the table (Lynn & Mynier, 1993) and smiling at customers (Reis, 1990) also lead to a larger tip.

In Experiment 1, the effect of mimicry on the size of the tip was assessed. Verbal mimicry was chosen for two reasons. First, speech has been shown to be especially vulnerable to mimicry (Bock, 1986; 1989; Capella & Planalp, 1981; Giles & Powesland, 1975; Levelt & Kelter, 1982; Neumann & Strack 2000; Webb, 1969; 1972). Second, verbal mimicry is easily implemented in a restaurant setting and appears to be a normal part of the interaction. We examined whether verbal mimicry resulted in larger tips.

Experiment 1

Method

Overview. A waitress in a restaurant verbally mimicked half of her customers and did not verbally mimic the other half. She did this by literally repeating the customer's order in the mimicry condition and not repeating the order in the non-mimicry condition. Afterwards the size of the tip was assessed.

Participants and design. Sixty groups of customers, without their awareness, participated in this experiment, 30 groups in each condition. Each group was randomly assigned to either the mimicry or the non-mimicry condition of one group. One group in the non-mimicry condition was left out of the analysis, because the waitress accidentally mimicked part of their order, leaving a total of 59 groups. The average group consisted of 2.35 people and there was no difference in group-size between the two conditions. The experiment had a single factor (behavior: mimicry vs. non-mimicry) between-subjects design.

Procedure. Upon arrival in the restaurant, the waitress asked each group of customers where they would like to sit and guided them to their table. After picking up a menu and the cutlery from the side station, she returned to the table to take the customers' orders.

In the mimicry condition, all orders were literately repeated, from the drinks to the check. In the non-mimicry condition, the orders were not repeated, but the waitress made clear that she understood the order, for example by saying "okay!" or "coming up!" With the exception of the verbal mimicry, the waitress was instructed to ensure that all other behaviors were the same across conditions.

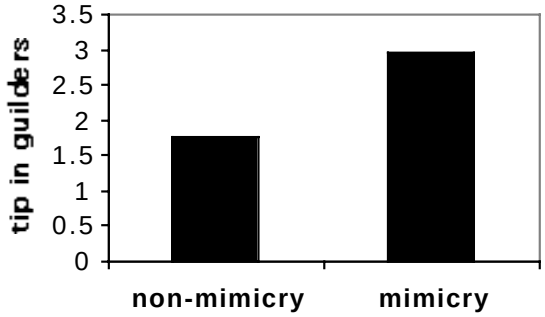
Results

Tips. A chi-square test on the number of times that a tip was given indicates that groups in the mimicry condition gave marginally more often a tip (81 %) than groups in the non-mimicry condition (61 %), $\chi 2 = 2.85$, $p < .09$.

To test the prediction that mimicry leads to a higher tip, the size of the tips were subjected to a t-test for independent samples. As depicted in Figure 1, the results indicate

that the average tip was higher in the mimicry condition (M = 2.97 Dutch guilders)[13] than in the non-mimicry condition (M = 1.76 Dutch guilders), $t(1,58) = 2.02$, $p < .05$.

Figure 1: Amount of tips received by the waitress in the mimicry- and non-mimicry condition



Additional analyses were performed in which the size of the tip was controlled for the number of people in a group, and in which the size of the tip was controlled for size of the check. In both cases the same pattern of results was obtained

Discussion.

The first experiment confirmed the hypothesis that mimicry increases tipping. When a waitress mimicked her customers by literally repeating their order, she received a larger tip than when she did not mimic her customers. Mimicry increased the size of her tips by more than 68%. These results suggest that mimicking may be beneficial by making people more generous towards those who mimic them.

Although Experiment 1 confirmed our expectations, there were several limitations in this study that we addressed in Experiment 2. First, the waitress was not blind to the hypothesis. In Experiment 1 her behavior may have, inadvertently, not only differed in its degree of mimicry, but in other relevant respects as well. In the second study, a waitress who was naïve with respect to the hypothesis was included to rule out this possibility. Second, it is possible in Experiment 1 that the effect of verbal mimicry may have been due to the customer believing that the waitress understood the order rather than the

[13] Service in The Netherlands is always included in the price. Relatively small tips are given and they express the customer's satisfaction. A Dutch guilder is approximately US $ 0.40.

mimicry. In the second study, the waitresses wrote down every order, visible to the client, so it was clear that the waitress understood the order. Furthermore, while the order was repeated literally in the mimicry condition, in the non-mimicry condition a verbal reaction was given to ensure that there was no difference with regard to customer's belief that their order was understood.

Third, it was unclear in Experiment 1 whether tip size increased when the customer was mimicked, or whether tipping decreased when the customer was not mimicked. To address this problem, we registered the size of the tips of the naïve waitress two weeks prior to the actual experiment to serve as a baseline for the mimicry- and non-mimicry conditions.

Experiment 2

Method

Overview. Experiment 2 was similar to Experiment 1 with three important exceptions. First, a waitress was included who was unaware of the hypotheses. Second, the waitresses wrote down each order in addition to their verbal responses. While in the mimicry condition the waitresses literally repeated the orders, in the non-mimicry condition, the orders were not repeated, but the waitress made clear that she understood the order, for example by saying "okay!" or "coming up!" With the exception of the verbal mimicry, the waitress was instructed to ensure that all other behaviors were the same across conditions. In both conditions it was therefore clear to the customer that their order was understood. Third, for the naïve waitress, a baseline condition was established before the experiment by registering the average tip size she received in general (N = 21 groups)[14]. Both waitresses ran 30 groups in each condition, making a total of 141 groups. The average group consisted of 2.19 people.

Results

Tips. The number of times a tip was given was subjected to a Chi Square test. The results indicated that the waitresses received a tip more often in the mimicry condition (78 %) than in the non-mimicry condition (52 %), $\chi 2 = 9.38$, $p < .01$. This difference was

[11] One group gave a tip that deviated more than 2,5 SD's from the mean and was subsequently left out of the analyses

significant for both the naïve ($\chi 2 = 4.58$, $p < .05$) and the not naïve waitress ($\chi 2 = 4.70$, $p < .05$).

The size of the tips was subjected to a between subjects ANOVA comprising the factor Waitress (naïve vs. not naïve), and the factor Mimicry (mimicry vs. non-mimicry vs. baseline). The baseline level of the Mimicry factor was only obtained for the naïve waitress, so the overall design contains one empty cell. Nevertheless, all contrasts of interest can be tested within this design.

A significant main effect for Mimicry was found, $F(1,135) = 13.45$, $p < .01$. The results showed that in the mimicry condition the average tip was higher ($M = 2.73$ Dutch guilders) than in the non-mimicry condition ($M = 1.36$ Dutch guilders). There was no difference in the effect of Mimicry between the two waitresses; the Waitress X Mimicry interaction was not significant, $F(1,135) = 1.58$, $p > .21$. If we nevertheless look at the simple effects of mimicry versus non mimicry for each of the waitresses separately, we observed a significant effect for the naïve waitress ($M= 3.18$ in the mimicry condition versus $M= 1.32$ in the non mimicry condition), $F(1,135) = 12.12$, $p < .01$, and a marginally significant effect for the non naïve waitress ($M= 2.30$ in the mimicry condition versus $M= 1.39$ in the non mimicry condition), $F(1,135) = 2.91$, $p < .10$

Within this same design, for the naïve waitress we tested contrasts with the baseline condition. While the results indicated that she received marginally significant higher tips in the mimicry condition ($M = 3.18$) compared to baseline ($M = 2.17$), $F(1,135) = 2.85$, $p = .09$, there was no significant difference between the non mimicry condition ($M = 1.32$) and the baseline condition ($M = 2.17$), $F(1,135) = 2.03$, $p > .15$, as can be observed in Figure 2.

As in Experiment 1, the same pattern of results was found both when the size of the tip was controlled for number of people in a group, and when the size of the tip was controlled for size of the check.

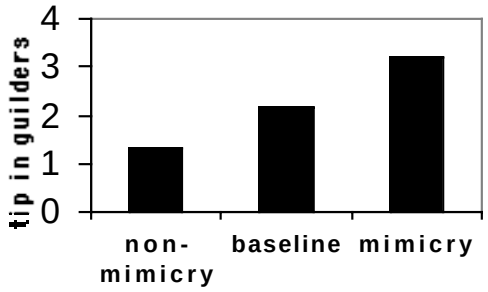


Figure 2. Amount of tips received by the naïve waitress in the non-mimicry-, baseline- and mimicry condition.

General Discussion

The two studies presented here provide evidence that mimicry can be used to increase tip size. In two studies, a waitress received a larger tip when she mimicked her customers than when she did not. In Experiment 2, a naïve waitress was added who replicated the findings from Experiment 1, thereby suggesting that experimenter effects are not able to account for the obtained results. In addition, the results from Experiment 2 suggest that mimicry increases the size of the tips in comparison to baseline, although this effect was marginally significant. Taken together, these studies indicate that people who are being mimicked become more generous towards the person who mimics them, thereby providing support for the adaptive function of mimicry.

Previous studies have shown that mimicry enhances positive feelings for the mimicker. The present studies went beyond these findings by showing that mimicry also has important behavioral consequences. Moreover, the present studies demonstrated these effects in a real-life restaurant setting. Thereby, we were able to support the external validity of the consequences of mimicry.

There are several limitations to the present studies that need to be addressed. Although all possible care was taken to ensure that the treatment of the experimental groups only differed in the amount of mimicry and not in the actual amount of attention paid to the customer, it may be possible that the manipulation also differed in perceived attentiveness. When the waitress literally repeats the order of the customer, he or she may

(unconsciously) perceive that as more attentive than a verbal reaction to the order. Although the latter verbal reactions were meant to serve as the waitress' way to signal that she attentively registered the order, we cannot exclude that verbal mimicry is a more effective way of giving the impression that one is attentive. However, even if that were the case, it is quite conceivable that perceived attentiveness is an integral part of the effect of mimicry. Among several other possible effects, for example liking (Chartrand & Bargh, 1999) and interpersonal closeness (Van Baaren, et al, 2002), perceived attentiveness of the mimicker by the mimicked may increase through mimicry. These possibilities need to be addressed in future studies in a more controlled and standardized environment.

Another limitation of the present studies is concerned with the baseline condition. Two weeks prior to the experiment the "normal" amount of tips of the naïve waitress was assessed in order to compare the experimental conditions to this baseline measure. It is possible that the circumstances at the time of the baseline measurement (e.g. weather conditions, pay-check time) were different than at the time of the experiment. In future research, an alternative condition may be a condition, where in waitresses act "normal."

Taken these possible shortcomings of the baseline condition, at the present time it is not possible to give a definite answer to the question whether mimicry actually increases tips or whether non-mimicry decreases tips. The studies clearly demonstrated however, that mimicry influences the size of a tip.

The mimicry in the present studies was calculated. An interesting question is whether non-conscious mimicry has the same effects on tipping behavior. Previous research in which people were mimicked (Chartrand & Bargh, 1999; Van Baaren, et al, 2002) has found that participants are unaware of the fact that they were mimicked. Also, in the present studies, when debriefed, the waitresses indicated that there was no reason to assume that customers had noticed the mimicry. Therefore it seems likely that the mimicry was unconscious at least for the mimicked. Future research may cast more light on the comparability of conscious and unconscious mimicry.

Previous research has shown not only that we like people who mimic us better than people who do not mimic us (Chartrand & Bargh, 1999), but also that mimicry makes us feel closer to other people (Van Baaren et al, 2002). Although the present

studies are inconclusive with regard to potential mediation, it is conceivable that the interpersonal consequences of mimicry play a mediating role in the presently reported behavioral effects of mimicry. For example, greater liking and closeness may constitute necessary psychological conditions for enhancing generosity. It is equally possible, however, that increased tipping is a direct effect of being mimicked and feelings of interpersonal closeness and liking merely constitute parallel effects of the mimicry.

A related question that needs to be addressed is whether the observed effect of mimicry is specific to the person who does the mimicry, or whether a more pro social orientation in general is induced through mimicry. It is possible that the effect of mimicry is a more diffuse state in which the interaction with the environment in general is more pro-social. When the effect of mimicry on the mimicked person is diffuse, than it is conceivable that the induced pro-social state is easily transferred to other people and situations, instead of being specifically targeted at the mimicker. Future studies should address this possibility by looking at the effects of mimicry on other people than just the mimicker. Will other people also benefit from a more pro-social mimicked person?

By investigating the consequences of mimicry, the present studies are a first attempt in answering our initial question concerning the function of mimicry. One possible function of mimicry is that it enhances the benevolence of the mimicked person. In two studies it was found that mimicry is beneficial to the person who does the mimicry. Customers, who were mimicked by a waitress, were willing to leave her larger tips compared to customers who were not mimicked. We propose that the observed effects of mimicry are not restricted to tipping behavior in the waiter-customer interaction, but may be observed in a wide variety of social situations. What other advantages could be gained by mimicry? Tentatively, we assume that all pro-social behaviors may be fostered by mimicry. Helping others who are in need of help, sharing resources with group members, and even the purpose of bonding and mating may be facilitated by mimicry. This way, mimicry may be a powerful tool in building and maintaining positive relationships between individuals.

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Summary

People have a tendency to do what others do. For example, two lovers in a bar, who take over each other's posture while telling each other how much they are in love, or two grandmothers who are nodding and taking over facial expressions as they discuss the latest news about their grandchildren, or the apprentice, who takes over the posture of his boss. Laughing, yawning, and accents are contagious too. Although we sometimes mimic each other on purpose, most of our mimicry occurs outside of our awareness.

Remarkably, given social psychology's focus on the influence of our social environment on cognition and behavior, relatively little research has been conducted on non-conscious mimicry in this field. Because, mimicry and our social environment are closely intertwined, mimicry should conceivably be at the heart of social psychology.

Automaticity of mimicry

Evidence for the automaticity of mimicry comes from several directions. First, evidence for the automaticity of mimicry comes from neuroscientific research on so-called "mirror neurons." This research shows that, within our brains, there is an intimate link between observing an action, performing the same action ourselves, and merely thinking about that action. The same areas in the brain that take part in performing a particular action are also activated when we merely perceive another person performing that specific action. Furthermore, the fact that neonates are imitators supports the notion that mimicry is an innate tendency. Mimicry has been observed from "day 1." Convincing evidence that mimicry occurs spontaneously and is not a behavior that is rapidly learned in the first weeks of life comes from studies on children who were literally just born.

Although the above results provide convincing evidence that we automatically mimic other people, an important question that still needs to be answered is why we mimic? In the animal domain (e.g., gnus and mackerels), it is argued that mimicry helps to enhance safety. By moving in large groups and fleeing when other individuals flee, animals increase their chances of survival. However, for humans, most current dangerous non-human predators are locked up behind strong iron bars in the local Zoo. Therefore, a

safety in numbers explanation doesn't seem to be sufficient to explain why humans mimic.

Several researchers, however, argue that mimicry does not necessarily have to be directed at a specific goal or serve as a tool to achieve instant reinforcement, but it may also be beneficial in social interactions. The work by these researchers suggests that there is also a social element to mimicry. In the present dissertation, a new perspective on mimicry will be proposed: Mimicry is a general, unintentional, behavioral tendency that leads to non-targeted outcomes, which nevertheless, as a general process, contributes to our survival.

The dissertation

The present dissertation consists of 5 chapters. In Chapter 1, the relevant literature will be reviewed and a social perspective on mimicry will be proposed. In this dissertation, the hypothesized social function of mimicry will be examined in four research questions, which correspond with the four empirical chapters. In Chapter 1, the four empirical chapters will be reviewed and the proposed social function of mimicry will be evaluated.

Mimicry and interpersonal closeness

Chapter 2 examines whether mimicry is moderated by the closeness we feel towards others. Influential theories on the self acknowledge that the self consist of several parts. On the one hand people are unique and independent individuals with traits and characteristics that are independent of context. This has been called the personal self. On the other hand much of who we are is based on our relationships with other people, for example, our family, our friends, and our membership in groups. This part of the self, termed the social self, accentuates the inclusion of others in the self and a fundamental connectedness to other people. In the Chapter 2, the central thesis is that more mimicry will occur when the social self is activated compared to when the personal self is activated.

In Experiment 2.1 and 2.2, either the personal or social self was activated outside of the participant's awareness (by using words like "I" versus "we"). Subsequently, a

hidden camera observed whether or not participants imitated the confederate's behavior. The results showed more mimicry in the social self condition than in the personal self condition. In Experiment 2.3, we examined cultural differences in chronically dominant independent construals of the self (Americans) or in interdependent construals of the self (Japanese). It was found that Japanese participants mimicked more than American participants. These studies demonstrate a relation between our social environment and mimicry. When we feel connected to others, when our social self is active, we are more inclined to non-consciously take over other's behaviors. In socially oriented cultures (e.g., Japan) more mimicry occurs than in individualistic oriented cultures (e.g., United States).

Cognitive style and mimicry

The social and personal self are associated with information processing styles. Research has shown that the personal self is associated with a processing style in which other objects are also perceived as less integrated in their respective contexts. In contrast, the social self is associated with a cognitive style in which objects and contexts are integrated. For example, it has been observed that the personal self improves performance on the Hidden Figures Test, whereas the social self improves performance on tasks where missing elements are to be identified. Based on the finding that closeness to others moderates mimicry, it is conceivable that the processing styles associated with the different self-construals have a moderating effect on mimicry too.

In Chapter 3, a bi-directional relation between mimicry and cognitive style was observed. People who on a perceptual level isolate objects from their contexts, mimic more than people who ingrate objects and their contexts. In Addition, it was found that being mimicked leads to a greater context-dependency. These findings illustrate the unintentional nature of mimicry. We do not mimic because we want to or choose to, but we mimic because of the nature of the relationship with our social environment. Mimicry is a deeply rooted, automatic component of our interaction with the social environment.

Further evidence for the unintentional nature of mimicry comes from several studies in Chapter 2 and Chapter 3. First, participants in Experiments 2.1, 2.2, 2.3 and 3.2 mimicked a confederate in a situation where there were no tangible rewards. Besides the hypothesized social reason, there was no other reason (e.g., material reasons) to mimic

the confederate. Second, in Experiment 2.1, participants took over the mannerisms of someone who was shown on a TV-screen. If mimicry were driven by a desire to achieve instant rewards, this would be useless.

Consequences of mimicry for the mimicker

Although the previous chapters demonstrate that mimicry is not an intentional tool to get specific rewards in specific situations, mimicry should have beneficial consequences in order to be adaptive from an evolutionary perspective. Chapter 4 and Chapter 5 investigate the beneficial consequences of mimicry. The results of Experiment 4.1 show that participants, who have been unobtrusively mimicked by an experimenter, helped that experimenter more than non-mimicked participants. When the experimenter "accidentally" dropped a number of pens on the floor, the mimicked participants were more likely to help the experimenter than non-mimicked participants. In Experiments 5.1 and 5.2, the pro-social consequences of mimicry were tested in a real life setting. Specifically, waitresses in a restaurant were trained to either verbally mimicked or paraphrased her guests. The results from both studies indicated that the waitresses received larger tips after mimicking than paraphrasing. Taken together, these studies demonstrate that mimicry leads to beneficial social consequences.

The question remains why mimicry leads to such positive consequences. Does mimicry create "something special" between two people or does mimicry change the way a mimicked person interacts with her environment? In order to disentangle these possibilities it is necessary to investigate how a mimicked person behaves towards a target other than the mimicker.

Consequences of mimicry for others

Experiments 4.2 and 4.3 were designed to examine whether other people than the mimicker also benefit from a more pro-social other. In Experiment 4.2. an experimenter either mimicked or did not mimic the participant's posture and mannerisms. Then the experimenter told the participant that a new experimenter would give them instructions for a second task and left the room. When the new experimenter entered the room she "accidentally" dropped some pens. The results showed that the mimicked participants

were more likely to help this new experimenter, thereby indicating that the more pro-social orientation of the participant is not restricted to the person who performed the mimicry. In Experiment 4.3, mimicked participants donated more money to a charity than non-mimicked participants. Because participants in this study were in a room by themselves when asked to anonymously donate money, it is unlikely that the mimicker directly influenced the donating behavior.

These results show that the consequences of mimicry are non-specific. Not only the mimicker benefits from the mimicked person, but others as well. Mimicry makes people's behavior more pro-social and their information processing more context-dependent (Experiment 3.3). These results suggest that mimicry does not seem to be "something special" between two people. The effects of being mimicked, or the non-conscious experience of similarity in perception and action, influences cognition and behavior. It is conceivable that this non-conscious experience informs us about the status of our interaction with the environment. Synchrony between our behavior and other's behavior signals to us that things are going okay, the environment is predictable and safe, and our interaction is running smoothly. When we do not experience this synchrony, this may signal us that something is not okay and that our environment is less predictable and we should be more careful.

conclusion

Taken together, the experiments conducted in this dissertation shed new light on mimicry. Mimicry turns out to be a non-specific, non-strategic, phenomenon which is moderated by closeness to others and cognitive style. In addition, the consequences of mimicry are general and broad. Not only the mimicker, but also other people profit from the beneficial consequences of mimicry. This suggest that mimicry does not just create "something special" between two people, but mimicry changes the way one perceives and behaves toward the environment. Objects are perceived to be integrated in their contexts and other people are treated more pro-socially. The fact that, in most cases, the mimicker is the one who benefits has a logistic cause rather than an emotional one. This dissertation adds to the existing knowledge on mimicry and introduces new theoretical insights. Now

even more, mimicry has been shown to be a potent mechanism which induces people to help each other, which is of fundamental importance to the social animals that we are.

Samenvatting
(Summary in Dutch)

Mensen hebben de neiging om elkaar na te doen. Het zal weinig moeite kosten om in het dagelijks leven voorbeelden van imitatie te ontdekken; verliefde stelletjes die in de kroeg dezelfde houding aannemen, twee oudere dames die elkaar hoofdknikkend het laatste nieuws vertellen of een werknemer die precies dezelfde lichaamshouding als de baas aanneemt. Ook blijkt dat lachen, geeuwen en accenten “besmettelijk” zijn. Hoewel we elkaar soms met opzet nadoen, speelt het merendeel van ons imitatiegedrag zich buiten onze bewuste controle af.

Binnen de sociale psychologie is er betrekkelijk weinig onderzoek gedaan naar het fenomeen *onbewuste imitatie*, hetgeen verwonderlijk is vanuit het oogpunt dat de sociale psychologie zich vooral richt op de invloed van de sociale omgeving op onze cognities en gedrag. Imitatie en de sociale omgeving zijn onlosmakelijk met elkaar verbonden en daarom hoort onbewuste imitatie eigenlijk thuis in het hart van de sociale psychologie.

Automaticiteit van imitatie

Vanuit verschillende wetenschapsgebieden binnen en buiten de psychologie zijn er aanwijzingen voor het automatische karakter van imitatie. Zo laten neurologische studies naar zogenaamde “spiegelneuronen” zien dat er in onze hersenen een intieme relatie bestaat tussen het waarnemen van een bepaalde actie, het denken aan die actie en het zelf uitvoeren van die actie. Dezelfde gebieden in de hersenen die actief worden als wij een bepaalde actie uitvoeren, worden ook actief wanneer wij enkel iemand anders dat gedrag zien vertonen. Vanuit onderzoek in de onwikkelingspsychologie zijn er sterke aanwijzingen dat imiteren aangeboren is. In verscheidene studies is imitatie (bijv. tong uitsteken als de ouder dat ook doet) aangetoond bij kinderen die pas enkele uren oud waren, hetgeen het bijzonder aannemelijk maakt dat imitatie aangeboren gedrag is.

Er is echter nog weinig bekend over het *waarom* van deze automatische neiging tot imitatie. In het dierenrijk (vooral bij prooidieren) wordt imitatie gezien als een middel

dat de kans op overleven vergroot. Wanneer een dier in een kudde of school vlucht wanneer andere dieren ook vluchten blijven ze bij elkaar in een grote groep en wordt de kans gegrepen te worden door een roofdier kleiner dan wanneer het dier zich van de groep afzondert. Hoewel dit evolutionaire voordeel misschien “in den beginne” een drijvende kracht achter imitatie was, lijkt het in de huidige tijd niet meer nodig om groepsgewijs uit de klauwen van een leeuw te blijven.

Wanneer men nu imitatie observeert bij mensen, maar bijvoorbeeld ook bij primaten, lijkt er een sociaal element in te zitten dat ervoor zorgt dat imitatie ook plaatsvindt in situaties waar het geen direct doel dient: imitatie om de imitatie. In deze dissertatie wordt getracht een beeld te geven van imitatie als een automatisch, niet-intentioneel, niet strategisch proces dat, desondanks, positieve sociale consequenties heeft.

De dissertatie

Deze dissertatie bestaat uit 5 hoofdstukken. In hoofdstuk 1 wordt een overzicht gegeven van de relevante literatuur en wordt een sociaal perspectief op imitatie geïntroduceerd. Dit sociaal perspectief wordt uitgesplitst in vier onderzoeksvragen. In elk van de vier empirische hoofdstukken (hoofdstuk 2 t/m 5) wordt steeds één onderzoeksvraag onderzocht. Hoofdstuk 1 is een overzichtshoofdstuk waarin de resultaten van de vier empirische hoofdstukken worden samengevat en besproken om het bewijsmateriaal voor de geopperde functie van imitatie te evalueren.

Imitatie en interpersoonlijke verbondenheid

In hoofdstuk 2 wordt onderzocht of imitatie gemodereerd wordt door de verbondenheid die wij voelen met anderen. Verschillende theorieën over “het zelf” stellen dat ons zelf bestaat uit een uniek, persoonlijk zelf en een sociaal zelf. Het persoonlijke zelf staat voor wie wij zijn “in een vacuüm”, ongeacht onze sociale context. Het staat voor het zelf dat constant is over verschillende situaties heen. Wij zijn echter ook voor een groot deel wie wij zijn op basis van onze relaties met andere mensen. Onze familie, vrienden, kennissen en groepen bepalen voor een groot deel onze identiteit. Dat noemen we het 'sociale zelf'. Het centrale idee in Hoofdstuk 2 is dat er vaker imitatie

optreedt als het sociale zelf is geactiveerd in vergelijking met activatie van het persoonlijke zelf.

In Onderzoek 2.1 en 2.2 werd, zonder dat de proefpersoon het wist, of het persoonlijke zelf geactiveerd (door bijvoorbeeld woorden als “ik” aan te bieden) of het sociale zelf (“wij”). Vervolgens werd met behulp van een verborgen camera gekeken of de proefpersonen gebaren van een andere persoon overnamen. De resultaten lieten zien dat imitatie vaker optrad als het sociale zelf actief was dan wanneer het persoonlijke zelf was geactiveerd. In Onderzoek 2.3 werd imitatie vergeleken bij mensen die een chronisch meer dominant persoonlijk zelf hebben (Amerikanen) met mensen die een chronisch meer dominant sociaal zelf hebben (Japanners). Gevonden werd dat Japanse proefpersonen meer imiteren dan Amerikaanse proefpersonen. Deze studies laten zien dat er een relatie bestaat tussen sociale omgeving en imitatie. Op het moment dat we ons meer verbonden voelen met anderen, als ons sociale zelf actief is, zijn we meer geneigd om onbewust het gedrag van anderen over te nemen. In culturen waarin mensen chronisch meer sociaal gericht zijn (bijvoorbeeld, Japan), treedt imitatie vaker op dan in meer individualistisch georiënteerde culturen (bijvoorbeeld, de Verenigde Staten).

Cognitieve verwerkingsstijl en imitatie

Het sociale en persoonlijke zelf gaan gepaard met corresponderende informatieverwerkingstijlen. Zo is gebleken dat mensen, wanneer het persoonlijke zelf is geactiveerd, andere zaken en objecten ook als minder geïntegreerd in hun context zien. Is ons sociale zelf actief, dan zie wij objecten juist meer geïntegreerd in hun context. Zo heeft onderzoek bijvoorbeeld aangetoond dat activatie van het persoonlijke zelf leidt tot een beter prestatie op een taak waar verborgen figuren moeten worden gezocht. Activatie van het sociale zelf stimuleert de prestatie op taken waarbij objecten aan hun context moeten worden gerelateerd, bijvoorbeeld het zoeken van missende elementen in tekeningen. Als imitatie door een gevoel van verbondenheid met anderen wordt gestimuleerd, roept dat de vraag op of activatie van de verwerkingsstijlen, die bij de verschillende delen van het zelf horen, ook een effect hebben op de mate van imitatie.

In Hoofdstuk 3 wordt de relatie tussen cognitieve verwerkingstijl en imitatie onderzocht. Er werd een bi-directioneel verband tussen imitatie en cognitieve

verwerkingsstijl gevonden. Mensen die -- puur perceptueel -- objecten en hun context meer geïntegreerd waarnemen, vertonen meer imitatie dan mensen die objecten en hun context juist meer scheiden. Tevens werd gevonden dat geïmiteerd worden leidt tot een grotere contextgevoeligheid. Het werkt dus twee kanten op. De bevinding dat er een bi-directioneel verband bestaat tussen imitatie en informatieverwerkingsstijl illustreert het niet-intentionele karakter van imitatie. We imiteren niet omdat we dat *willen* of ervoor *kiezen*, maar we imiteren omdat we op een bepaalde manier in onze omgeving staan. Imitatie is een diepgewortelde, automatische component van de interactie tussen ons en onze omgeving

Ook andere resultaten uit Hoofdstuk 2 en Hoofdstuk 3 suggereren dat imitatie niet een specifiek middel is om concrete zaken te bereiken in een interactie. Ten eerste imiteren proefpersonen in Onderzoek 2.1, 2.2, 2.3 en 3.2 een persoon in een situatie waar geen concrete voordelen te halen zijn. Naast de geopperde sociale reden is er geen andere (bijv. materiele) reden om die persoon na te doen. Ten tweede wordt in Onderzoek 3.1 gevonden dat proefpersonen gedrag overnemen dat op een TV-scherm werd vertoond. Dit strookt niet met een intentionele kijk op imitatie. In dat geval zou het imiteren van een persoon op een TV-scherm volkomen zinloos zijn.

Consequenties van imitatie voor de imitator

Hoewel automatische imitatie een neiging blijkt te zijn die niet volledig gestuurd wordt door concrete doelen in concrete situaties, moet het wel positieve sociale consequenties hebben wil het een evolutionair adaptief fenomeen zijn. In Hoofdstuk 4 en 5 worden de consequenties van imitatie onderzocht. Uit onderzoek 4.1 bleek dat proefpersonen die onopvallend door een proefleider werden geïmiteerd die proefleider meer hielpen dan proefpersonen die niet waren geïmiteerd. Als de proefleider “per ongeluk” een aantal pennen liet vallen, waren geïmiteerde proefpersonen meer geneigd om van hun stoel te komen en de proefleider te helpen. Onderzoek 5.1 en 5.2 onderzochten de positieve consequenties van imitatie in een veldexperiment. In beide studies imiteerde een serveerster wel of niet haar gasten. Dit deed ze door letterlijk de woorden van de gasten te gebruiken, of deze te parafraseren. Uit de resultaten bleek dat geïmiteerde gasten meer fooi gaven aan de serveerster dan geparafraseerde gasten. Deze

studies laten zien dat imitatie positieve sociale consequenties heeft: het levert voordeel op.

De vraag is echter wat imitatie precies doet om tot die consequenties te komen. Schept imitatie een speciale band tussen twee mensen die er vervolgens voor zorgt dat de een de andere helpt? Of verandert imitatie de geïmiteerde en hoe die zich vervolgens gedraagt tegenover haar omgeving? Om deze twee mogelijkheden te scheiden is het noodzakelijk om te kijken hoe een geïmiteerd persoon zich gedraagt tegenover anderen dan de imitator.

Consequenties van imitatie voor anderen

Onderzoek 4.2 en 4.3 zijn ontworpen om te onderzoeken of ook andere mensen dan de imitator profiteren van de positieve consequenties van imitatie. In Onderzoek 4.2 werden proefpersonen wel of niet onopvallend geïmiteerd door een proefleider. Vervolgens ging deze proefleider weg en kwam er een nieuwe proefleider binnen die “per ongeluk” een aantal pennen liet vallen. Het bleek dat proefpersonen die geïmiteerd waren deze nieuwe proefleider vaker hielpen dan proefpersonen die niet geïmiteerd waren. Dit betekent dat ook andere mensen profiteren van de gevolgen van imitatie. In Onderzoek 4.3 werd gevonden dat geïmiteerde proefpersonen meer geld aan een goed doel doneerden dan niet-geïmiteerden. De donatie vond in afzondering en anoniem plaats, hetgeen de invloed van de imitator op het donatiegedrag erg onwaarschijnlijk maakt. Deze onderzoeken laten zien dat de gevolgen van imitatie niet specifiek zijn. Niet alleen de imitator wordt geholpen, maar ook andere mensen profiteren ervan. Imitatie maakt mensen meer pro-sociaal in hun gedrag en meer context-gevoelig in hun informatieverwerking (Onderzoek 3.3). Het effect van imitatie lijkt dan niet zozeer een speciale band te zijn tussen twee mensen. Geïmiteerd worden, of de onbewuste ervaring dat perceptie en gedrag gelijk zijn, heeft invloed op cognitie en gedrag. Het zou zo kunnen zijn dat deze ervaring ons wat vertelt over de status van onze interactie met de omgeving. Synchronie tussen ons gedrag en het gedrag van anderen kan een teken zijn dat het goed gaat, dat de omgeving voorspelbaar en veilig is en onze interactie soepel verloopt. Wanneer wij iets anders doen dan de anderen om ons heen en er geen

synchronie is, kan dat een signaal zijn dat er iets niet goed loopt, dat de omgeving minder voorspelbaar is en dat het misschien beter is om waakzaam te zijn.

Conclusie

De onderzoeken die in het kader van deze dissertatie zijn verricht werpen een nieuw licht op de werking van imitatie. Imitatie blijkt een non-specifiek en niet-strategisch fenomeen te zijn dat gemodereerd wordt door verbondenheid met anderen en cognitieve verwerkingsstijl. Tevens is aangetoond dat de gevolgen van imitatie breed zijn. Niet alleen de imitator profiteert van de positieve consequenties van imitatie, maar ook andere mensen. Dit suggereert dat imitatie niet zozeer een speciale band creëert tussen twee mensen, maar dat imitatie een verandering in het denken en het doen van de geïmiteerde tot gevolg heeft. Dit zorgt er vervolgens voor dat de geïmiteerde objecten meer met hun context verbindt en anderen meer helpt. Dat de imitator in de meerderheid van de gevallen degene is die hiervan profiteert heeft dan meer een logistieke oorzaak dan een emotionele. Deze dissertatie draagt bij aan de kennis die we hebben over imitatie en voegt ze nieuwe theoretische inzichten toe aan de bestaande literatuur. Nog meer wordt duidelijk hoe imitatie een belangrijk mechanisme is dat ervoor zorgt dat mensen iets voor elkaar doen, hetgeen van fundamenteel belang is voor een kuddedier als de mens.

Curriculum Vitae

Rickert Bart van Baaren (roepnaam Rick) werd op 4 februari 1975, om 08:40 door een vakkundig uitgevoerde keizersnede geboren in het Ziekenhuis Velp. Vrijwel direct na zijn geboorte ging hij naar zijn huis in Arnhem. In 1993 behaalde hij zijn VWO-diploma op de Thorbecke Scholen Gemeenschap te Arnhem. Na een jaar studie aan de Northeast Missouri State University begon hij eind augustus 1994 zijn studie psychologie aan de KUN. In 1998 stuurde hij af in de sociale psychologie en hij begon direct als AIO aan dezelfde vakgroep. Deze dissertatie is het resultaat van die jaren. Zijn levensmotto "Never change a winning university" blijkt uit het feit dat Rick nu als universitair docent werkzaam is aan dezelfde vakgroep.

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