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**THE RULES OF ATTRACTION:  
TRUST, ANXIETY, AND GRATITUDE**

Katarzyna Ewa Kubacka



VRIJE UNIVERSITEIT

**The Rules of Attraction:  
Trust, Anxiety and Gratitude**

ACADEMISCH PROEFSCHRIFT

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de Vrije Universiteit Amsterdam,  
op gezag van de rector magnificus  
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in het openbaar te verdedigen  
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van de faculteit der Psychologie en Pedagogiek  
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door

Katarzyna Ewa Kubacka

geboren te Slupsk, Polen

promotor: prof.dr. P.A.M. van Lange  
copromotor: dr. C. Finkenauer

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## **Chapter 1:**

### **General Introduction**

“Love and marriage go together like a horse and carriage”, goes an old Frank Sinatra song. Indeed, people’s emotions are undeniably connected to their relationships, be they romantic or platonic. Two also affect each other: relationships affect the emotions we experience, and our emotional states affect our relationships. The substantial effect, which people’s relationships have on their emotional functioning is perhaps most evident in the finding that good social relationships are the necessary condition for happiness (Diener & Seligman, 2002). On the other hand, and most importantly for this dissertation, emotions also lead to, or facilitate the kind of relationships we have. After all, every successful relationship starts with the state of simple attraction, or liking someone. Similarly, as relationships unfold these affective states can bind people together, as in the case of love; or tear them apart, as in the case of hatred. In other words, the present dissertation explores the rules of attraction, or rather the mechanisms of initial and developed attraction and/or relationships focusing on emotional states such as trust, anxiety or gratitude.

Emotions tell people about their engagement with the world, they inform them about the things that they care about and the things they are bothered by (Frijda, 2005). For instance, experiencing anger at the sight of someone littering in a public space informs us that we are concerned with the norms of social hygiene. Furthermore, emotions can inform people about the expectations they have about others and the nature of their relationships with them (Clark & Taraban, 1991). For instance, experiencing disappointment when a friend did not console us on a bad day informs us that we are expecting the friend to be responsive to our needs. Analogically, the present work focuses on emotional influences on relationships - how people’s emotional reactions guide their social decisions, and, in turn, affect their relationship functioning.

In analyzing the interaction between emotional influences and social relationships I consider a spectrum of interpersonal relationships. Namely, I focus on two stages of interpersonal interactions: a) initial interactions with unknown others, and, b) established interactions between spouses. Looking at initial interactions, I consider the role of similarity in influencing people’s affective states of trust and attraction toward others. Furthermore, I investigate how anxiety determines peoples’ preferences for similar and dissimilar others. Looking at the established interactions

between spouses, I focus on the role of gratitude, which spouses feel for each. Specifically, I examine how gratitude motivates people to maintain their relationships. Thus, the present work examines diverse social backgrounds: starting from interactions with strangers, with no prior knowledge about the others, and ending with marital interactions between committed partners. As a result, this work offers novel insights into how affective states influence social relationships from their start to their later development stages.

### **Theoretical Background**

The underlying premise of this dissertation is that individuals' affective states influence and often determine the quality of their social interactions. Thus, the present work combines different research areas in social psychology. The work benefits from insights from research on relationships and emotion (all chapters), social cognition (e.g., in considering the global and local foci in Chapter 3), and memory research (e.g., in using the signal detection measure in Chapters 2 and 3). This multi-disciplinary approach of bridging the different areas of social psychology resulted in generating novel insights on the questions of partner selection and the similarity-attraction effect (as in Chapters 2 and 3), and relationships maintenance (as in Chapter 4).

At the same time, the diversity of this dissertation warrants some caution in clarifying the use of certain terms. For instance, the important debate in emotion literature is that of the distinction between emotions, affect, and feelings (e.g., Frijda, 2005; Baumeister, Vohs, DeWall, & Zhang 2007). In this work I focus on emotional states following the definition of Baumeister and colleagues (Baumeister et al, 2007). Namely I define emotional states as states of conscious feeling, which are saturated with cognitions and can be a result of cognitions, such as evaluations. These states are experienced as single states, for instance like the experience of being anxious about an upcoming job interview. However, they can also be a blend of basic emotions and moods, for instance when one feels good about a partner, and is grateful for having him or her in their life. Analogically, the present work applies the understanding of emotional states in relationship context. Specifically, it examines affective reactions (liking in Chapter 2), specific emotional states (anxiety in

Chapter 3), and broad emotional states that include cognitive appraisal and subjective feelings (gratitude toward the partner Chapters 4).

In addition, as stated before, the main focus of this dissertation is to consider emotional states in their social context, in that it examines the role of liking, trust, gratitude, and anxiety in forging and maintaining social relationships. Though there is a growing literature on the social aspect of emotions, research had long been mostly focused on the intrapersonal aspects of emotion (cf. Miller & Leary, 1992; Frijda, 2005). Throughout this dissertation, I consider these emotional states and their intrapersonal and interpersonal outcomes. This view is similar to considering emoting, which Mesquita (2010) defines as experiencing and communicating emotions in actions and not as static, intraindividual entity. Below I present overview of past research on the main emotional themes of the present dissertation: attraction and trust, the interpersonal effects of anxiety, and the interpersonal effects of gratitude.

### **Attraction and Trust**

The present work employs similarity as a trigger of attraction, and looks at trust as a mediator of attraction-similarity link. Trust has been defined as having three important features: a) predictability of partner's behaviour; b) dependability of partner's character; c) faith, that the partner will be responsive and caring in the future (Rempel, Holmes, & Zanna, 1985). Attraction is typically operationalized as liking, knowing or discussing with a target person (cf. Singh, et al. 2009). The finding that with increased similarity attraction to the target person increases as well has a long tradition in the area of social psychology, starting with the classic research by Byrne (1961). Past research has analyzed similarity in terms of attitude, values, and beliefs (e.g., Berscheid, 1985; Byrne, 1971), or personality (e.g., Duck & Craig, 1975; Klohnen & Luo, 2003). Interestingly, similarity has been found to be predictive of attraction at different stages of human development, starting for friendship development of three year-old children (Fawcett & Markson, 2010) to close relationships of adults (e.g., Luo & Klohnen, 2005). Recent literature review shows that similarity-attraction effect might often be attributable more to the *perception* of similarity rather than the *actual* similarity (cf. Montoya, Horton, & Kirchner, 2008). However, perception of similarity might have stronger effects in established relationships than in initial

interactions; the latter being the context of the research in the present dissertation. One of the reasons why perceived similarity might be especially beneficial for close relationship partners is that makes them feel more understood by partners who are ‘like them’ (Murray, Holmes, Bellavia, Griffin, & Dolderman, 2002). Given the above-mentioned robustness of the similarity-attraction effect the obvious question is: what are the reasons for the similarity-attraction effect?

Byrne and Clore (1967) proposed that similarity is attractive because it reinforces the attitudes of the self. According to this view, similarity provides a validation that self’s attitudes are legitimate and relevant, since they are shared with others. Furthermore, similarity addresses the basic human need for consistent and accurate perception of the world, because learning that the other shares one’s attitudes means that the way one sees the world is validated. Thus, similar people make us feel good not only about ourselves but also about the world. Another reason, already hinted upon is that similarity makes the self feel more understandable and more understood, since the other is like the self (Murray et al., 2002). The present dissertation proposes yet another reason why similarity might be attractive, that is because it makes the person trustworthy. Indeed, the role of trustworthiness in building relationships seems to be particularly important. For instance, Cottrell, Neuberg, and Li (2007) found that trustworthiness was the most important characteristic for people to find in potential acquaintances as well as close friends. Trust is also a key factor in ongoing happy close relationships (e.g., Rempel, Ross, & Holmes, 2001; Wieselquist, Rusbult, Foster, & Agnew, 1999). Also, extant research shows that similarity on particular traits leads to trust, which then mediates the similarity-attraction effect (Sing, et al. 2008). However, research in the present dissertation extends this finding by considering similarity in a dynamic context, with similarity information a) delivered at different times throughout an experiment; b) changing or remaining consistent through the experiment. As a result, the present research is in line with the growing literature on the importance of trust, by showing the importance of trust in the dynamic context.

### **The Interpersonal Effects of Anxiety**

In considering emotions anxiety is one of which social consequences have been much discussed. Some researchers go as far as saying

that the modern world is characterized by high levels of anxiety (e.g., Eckersley, 2006; Twenge, 2000). Twenge (2000) proposes that anxiety results from and, in turn, leads to a decline in people's ability to connect to others. Thus, anxiety seems to have a negative influence, at least on the quality of people's social relationships. Analogically, research conducted by Caughlin, Huston, and Houts (2000) shows that spouses' trait anxiety is negatively related to their relationship satisfaction. More specifically, the more anxious the spouses the less happy they are about their marriages from the marriage onset, but even 13 years later the difference between the more and the less anxious spouses remains. At the same time, literature also provides examples for the effects of the experience of anxiety, rather than dispositional anxiety. One of the most influential studies exploring attraction and anxiety comes from Dutton and Aron (1974), where male participants walked either a shaky or a solid bridge. The authors found that participants were much more attracted to, and more likely to pursue contact with the female after crossing the shaky bridge than the solid one. Thus, the unpleasant experience of anxiety can lead to an increased affiliative behaviour, perhaps in order to decrease the negativity of the experience.

The research in this dissertation focuses on how state anxiety affects people's partner choices. Namely, how anxious individuals react to similar and dissimilar others. Extant literature offers a mixed picture on this subject. In one of the few studies to date Heimberg and colleagues (Heimberg, Acerra, & Holstein, 1985) explored the interaction between anxiety and similarity-attraction phenomenon. The authors found that while non-anxious individuals exhibit the preference for similar others; anxious individuals do not distinguish in their preferences for similar and dissimilar others. At the same time, a different picture emerges from the research by Firestone, Kaplan, and Russell (1973). The authors found that anxious individuals tend to prefer the dissimilar others, over the similar others (Firestone, Kaplan, & Russell, 1973). In the light of the apparent debate in the literature, the current dissertation extends the previous findings by looking at how and why the experience of anxiety can affect people's social preferences, using similarity as a basis of social judgments.

### **The Interpersonal Effects of Gratitude**

Another one of the more prolific fields of enquiry in considering the social context of emotion has been the field of gratitude research (cf. Emmons & McCullough, 2004). The social nature of gratitude is clear when one considers that gratitude has been defined as an emotional response to a costly and intentional act of a benefactor, which is valuable to the recipient (Tesser, Gatewood, & Driver, 1968). In addition, McCullough and colleagues (McCullough, Kilpatrick, Emmons, & Larson, 2001) proposed that gratitude was connected to pro-social behaviour through its function of benefit detector, as well as a reinforcer and a motivator of prosocial behaviour.

Past research showcases different facets of gratitude's function as a motivator of pro-social behaviour. For instance, after receiving help from previously unknown confederates, grateful participants were more likely to help their benefactors with a boring task (filling in questionnaires) than non-grateful participants (Bartlett & DeSteno, 2006). It is important to note that the gratitude-induced helping behaviour was unrelated to the behaviour, which elicited gratitude. At the same time, past research has been mostly focused on one-off interactions with strangers (e.g., Bartlett & DeSteno, 2006), or initial interactions at a relationship formation stages (e.g., Algoe, Haidt, & Gable, 2008). Thus, the present dissertation contributes to the literature by considering gratitude in the context of close relationships.

### Chapter Overview

Chapter 2 of the present dissertation examines how similarity, and specifically changes in similarity, affects people's trust and thus attraction toward bogus target persons. Drawing from classic (Byrne, 1971) and more recent research (e.g., Singh, Lin, Tan, & Ho, 2008) regarding the similarity-attraction effect, the research explored the effects of similarity versus dissimilarity in a dynamic context, examining the effects of change over time in similarity information on attraction and trust. We defined change in similarity as new information about another person's level of similarity to the self which alters old information about the other's level of similarity to the self. Specifically, a *change toward similarity* indicates that the new information about the other shows more similarity than the old information; a *change toward dissimilarity* indicates that the new information about the other shows less similarity than the old

information. In line with existing research, we found that old similarity information followed by new dissimilarity information causes reduced attraction, whereas old dissimilarity information followed by new similarity information causes enhanced attraction. Moreover, extending existing research, we found that change in similarity caused parallel effects on feelings of trust in a partner, and that such changes in perceived trustworthiness mediated the effect of change in similarity on attraction.

Chapter 3 of the present dissertation extends the findings of Chapter 2 by looking at the role of anxiety in attraction towards others who are similar or dissimilar to self. Namely, in this chapter I examine how anxiety moderates the similarity-attraction phenomenon. As a starting point to the research, and in line with previous research, we assumed that people intuitively prefer others who are similar rather than dissimilar to self (Byrne, 1971). We further proposed that this intuitive preference for similarity may be moderated by anxiety. Based on the self-compatibility checking model we proposed that emotional distress can disrupt people's access to the self's intuitive preferences (Kuhl & Kazén, 1994). Consequently, anxiety eliminated the effects of similarity on attraction, leading to equally high attraction towards others who are similar and others who are dissimilar to self.

Chapter 4 investigates the role of gratitude in the context of marital interactions. I advance a model of relationship maintenance, in which gratitude plays a key role in the maintenance of close relationships. Specifically, I propose that gratitude in close relationships serves as a detector of perceived partner responsiveness and a motivator for effortful relationship maintenance. In this research I combined the insights from past studies concerning gratitude as well as relationship maintenance. Namely, past research has shown that gratitude is an inherently social emotion that results from social interactions (McCullough, Kilpatrick, Emmons, & Larson, 2001). In addition, research has shown that perceived partner responsiveness and relationship maintenance behaviours are inherently relational phenomena (e.g., Reis & Shaver, 1988). Thus, the model proposes that the effects of gratitude have dyadic consequences in that one partner's efforts to maintain the relationship should elicit feelings of gratitude in the other partner. This dyadic model of gratitude in close relationships emphasises that gratitude serves a dual

function: detecting partner responsiveness and motivating maintenance behaviour. In testing the proposed model Chapter 4 takes a longitudinal approach, by considering three different time points, and providing a longitudinal test of the dyadic model of gratitude in close relationships. Thus, I investigated whether the extent to which people are grateful toward their partner is of long-term consequences. In doing so, I provided a novel look into the functioning of gratitude in close relationships by analyzing the within-individual and the across-partner pathways of our model.

### **Concluding Remarks**

In investigating the interplay between emotional states and social relationships I have utilized a variety of research tools. Namely, Chapters 2 and 3 are based on experimental designs, while Chapter 4 is based on prospective, longitudinal data from married couples. As a result, this dissertation combines different traditions of research methods and techniques. Throughout the current work, together with my co-authors, we use various experimental manipulations, for instance: creating bogus partners, whose profiles are created as to reflect similarity or dissimilarity to the participants. In addition, we utilize a number of behavioural manipulations, for instance we evoke anxiety through having participants perform a public speaking task; or we stimulate mindfulness through having participants listen to a body-scan meditation exercise. In terms of our use of the prospective data, we look the relationships between both partners' gratitude and relationship maintenance. As a result, we are able to see how one partner's behaviour affects the other partner's emotional state as well as behaviour. In addition, we look at the interplay of gratitude and relationship maintenance within a single time point as well as across time.

Thus, the present work offers a multi-method approach to examining the influence of emotional and affective states on relationships. To this effect, Chapter 2 illustrates how similarity and changes in similarity information help to shape trust and thus attraction to an unknown target. Chapter 3, illustrates how anxiety affects people's liking for previously unknown partners, leading anxious individuals to have no preference for similar others. Chapter 4, on the other hand, illustrates how gratitude motivates spouses to work on maintaining their relationship.

Frank Sinatra sings about 'love and marriage', given the present dissertation 'gratitude and marriage' would also be a fitting, though slightly less catchy song title.



## Chapter 2:

### That Warm and Fuzzy Feeling:

### Change in Similarity and Interpersonal Evaluations<sup>1</sup>

This work examines how change in partner similarity influences attraction and perceived partner trustworthiness. Two experiments investigated how people evaluate partners who are initially presented as similar (vs. dissimilar) on a first set of traits, and as dissimilar (vs. similar) on a second set of traits. The results showed that change toward similarity caused increased attraction, whereas change toward dissimilarity caused reduced attraction. Change toward dissimilarity reduced attraction more than change toward similarity increased attraction. Supporting our relational analysis of the functions of similarity, change in perceived partner trustworthiness mediated the effects of change in similarity on attraction. This work demonstrates that: change in similarity affects subsequent attraction; and similarity promotes attraction partly through eliciting feelings of trust in a partner.

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<sup>1</sup> **This chapter is based on:** Kubacka K.E., Finkenauer C., & Rusbult, C.E. (2010). *That warm and fuzzy feeling: Change in similarity and interpersonal evaluations*. Manuscript submitted for publication.

We like people who are similar to us. Numerous empirical studies demonstrate that attraction is promoted by similarity with respect to traits, attitudes, and ideals, and that these forms of similarity are prevalent in satisfying relationships (for a review, see Berscheid & Reis, 1998). However, research in this tradition typically assumes that similarity is stable and unchanging – an assumption which may not reflect the reality of developing relationships. Over the course of extended interactions, people obtain new information about one another, and this information may indicate a change in the level of interpersonal similarity. For example, when Mary and James first meet, they may discover that they are both rather unconventional people. This similarity will not only cause Mary to feel attracted to James but may also instil her confidence that James is someone she can count on and trust to meet her needs. But over the course of their unfolding relationship, Mary not only confirms that James is unconventional but discovers that he is more ambitious than she is. How will Mary feel about James upon discovering such dissimilarity?

Drawing from classic (Byrne, 1971) and more recent research (e.g., Singh, Lin, Tan, & Ho, 2008) regarding the similarity-attraction effect, the present research explores the effects of similarity versus dissimilarity in a dynamic context, examining the effects of change over time in similarity information on attraction and trust. We define change in similarity as new information about another person's level of similarity to the self which alters old information about the other's level of similarity to the self. Specifically, a *change toward similarity* indicates that the new information about the other shows more similarity than the old information; a *change toward dissimilarity* indicates that the new information about the other shows less similarity than the old information. In line with existing research, two experiments tested the prediction that – holding overall level of similarity constant – old similarity information followed by new dissimilarity information causes reduced attraction, whereas old dissimilarity information followed by new similarity information causes enhanced attraction. We also examined the possibility of dissimilarity-similarity asymmetry, or whether the effects of change toward dissimilarity are more deleterious than the effects of change toward similarity are beneficial. Importantly, extending existing research, we predicted that change in similarity would cause parallel effects on feelings of trust

in a partner, and that such changes in perceived trustworthiness would mediate the effect of change in similarity on attraction. Furthermore, to replicate these relational effects and explore the intrapersonal effects of similarity, Study 2 examined the impact of change in similarity on cognitive processes – on the detection and recall of similarity information – and explored whether our findings are moderated by potentially relevant personal dispositions.

### **Similarity and Similarity Change in Interpersonal Relationships**

The *similarity-attraction effect* describes the fact that similarity significantly and reliably shapes initial attraction. Byrne (1971) employed a “bogus stranger” paradigm in his pioneering research regarding this phenomenon. In this paradigm, the participant completes an attitudes questionnaire, reviews an attitudes questionnaire completed by a target person with whom he or she will soon interact, and evaluates the attractiveness of that person. The attitudes endorsed by the target person are faked in such a manner as to manipulate degree of similarity to the participant’s attitudes. Contrary to the truism that opposites attract, a strong linear relationship between similarity and liking routinely is observed – similarity reliably generates positive affective evaluations. Similarity has been shown to be important in shaping initial attraction (Byrne, 1971), generating the feeling that one is understood by a partner (Murray, Holmes, Bellavia, Griffin, & Dolderman, 2002), and sustaining relationship satisfaction in romantic relationships as well as friendships (e.g., Klohnen & Luo, 2003; Murray, et al., 2002; Ledbetter, Griffin, & Sparks, 2007). Thus, the similarity-attraction link is recognized as one of the most robust empirical phenomena in work regarding interpersonal relationships (Berscheid & Reis, 1998).

**Stability versus change.** Does change in similarity matter? Imagine that Mary had first dates with two men - Robert and James. After their dates, she sees Robert as mostly similar to her, while she sees James as mostly dissimilar to her. Although she favours Robert, she agrees to go on second dates with both of them. Robert and James reveal more information about them, and based solely on the new information acquired during this second date, Mary sees both as equally similar to her: Robert reveals new information about himself that again is mostly similar to Mary. James too reveals new information and based on this new in-

formation Mary now sees him as mostly similar to her. Based on the old and new information from both dates, however, Robert has a clear advantage because overall he is more similar to Mary than James. Yet is Robert really the one that Mary will like best? One could assume that stability is advantageous to change, because it communicates a higher, overall, level of similarity, and so Mary should prefer Robert. In line with this suggestion, Smeaton and colleagues (1989) demonstrated that, holding the level of dissimilarity constant, attraction toward a stranger systematically increases as the level of shared similarity increases.

Nevertheless, there is reason to suggest that change outweighs stability and that Mary's liking will be determined by the new, rather than the overall, information about both men. Indeed, classic research (Byrne, Lamberth, Palmer, & London, 1969) suggests that when participants evaluate others in a continuous fashion it is the new, instead of the overall, information which affects people's attraction to others. Likewise, a study by Norton and colleagues (Norton, Frost, & Ariely, 2007) explored perceptions of partner similarity among online daters both before and after an initial face-to-face date. Prior to their initial encounter, participants anticipated high levels of similarity and reported strong feelings of attraction. However, following the initial encounter – during which time individuals acquired new information about one another – those who discovered greater dissimilarity than they had anticipated reported reduced attraction to the partner. Thus, the new dissimilarity information yielded reduced attraction.

Moreover, theory and research from other areas provide further, albeit indirect, support for our suggestion that new (dis)similarity information is relevant enough to affect interpersonal evaluations. For instance, classic work by Aronson and Linder (1965) demonstrates that changes in rewarding behaviour from others have a greater impact on an individual than stable rewarding behaviour. Furthermore, interdependence theory (Kelley & Thibaut, 1978) employs the concept of diagnostic situations. These situations reveal partners' true motives, such as situations of conflict in which partners face a dilemma of benefiting themselves or their relationships (Rusbult & van Lange, 2003). We propose that in the context of initial interactions, where partners do not know much about each other new similarity information is likely to be diagnos-

tic, because it provides hints about how partners might react to the self and whether they can be relied upon to be responsive to one's needs. Hence, even though stability, relative to change, may indicate a higher overall level of similarity, it is the new similarity information that is consequential for attraction and trust.

**Moderating role of dissimilarity.** But precisely how do people process information regarding change in similarity? For example, is a change from 75 percent similar to 25 percent similar experienced the same as a change from 25 similar to 75 percent similar (in both cases, overall similarity-dissimilarity is 50-50)? Is similarity and dissimilarity information weighted equally in shaping feelings of attraction? Some research suggests that dissimilarity may be more powerful, as it yields greater repulsion than similarity yields attraction (cf. Singh et al., 2008; Rosenbaum, 1986). Literature on *positive-negative asymmetry effect* – the finding that in shaping overall impressions of a target, negative information is weighted more strongly than positive information (for a review, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) – also supports this dissimilarity-similarity asymmetry claim. Assuming that similarity information increases attraction and trust and dissimilarity information decreases attraction and trust, we should find that change in similarity exerts asymmetrical effects on attraction: The costs of dissimilarity should be greater than the benefits of similarity. Hence, in combination with our first hypothesis that change outweighs stability, we anticipate dissimilarity-similarity asymmetry, whereby change toward dissimilarity more powerfully affects attraction than change toward similarity.

### **Similarity as a Signal of Trustworthiness**

Why does partner similarity exert such reliable effects on attraction? As alluded to previously, we suggest that this association rests at least in part on *perceived partner trustworthiness*, or the perception that a partner can be relied upon to care for one and be responsive to one's needs, now and in the future (Holmes & Rempel, 1989). Specifically, we propose that similarity information communicates trustworthiness. A partner who is “like me” is assumed to possess benevolent motives, whereas a partner who is “unlike me” is assumed to possess somewhat more malevolent motives (Murray et al., 2002). Importantly, we suggest that

trust at least partially mediates the impact of change in similarity on attraction.

The extant literature provides indirect support for these predictions: Interpersonal similarity has been shown to influence the perception that a partner is accepting, feelings of familiarity, kinship-related cognition, and prosocial motivation and behaviour (Moreland & Zajonc, 1982; Murray, Holmes, & Collins, 2006; Park & Schaller, 2005). Thus, the mere perception of shared features seems to carry symbolic meaning about another person, signalling that the other is trustworthy (Becerra & Gupta, 2003; Rusbult, & Van Lange, 2003). Moreover, given that trust is one of the most crucial determinants of people's judgments about others' suitability for interdependent relationships (Cottrell, Neuberg, & Li, 2007), it seems probable that trust plays a role in shaping feelings of attraction. Accordingly, we predict that similarity information promotes the feelings of trust in a partner whereas dissimilarity information promotes mistrust, and that these feelings, in turn, affect attraction. Because we propose that new similarity information is diagnostic for the other's motive regarding the self, these predictions should apply to change in similarity as well. Specifically, change toward similarity should promote feelings of trust in a partner whereas change toward dissimilarity should promote mistrust. These changes in perceived partner trustworthiness, in turn, should cause corresponding changes in feelings of attraction to a partner. In other words, we predict that similarity yields the "warm and fuzzy" feeling of trust, which makes the other person seem more attractive.

### **Research Overview**

The overarching premise guiding the present work is the claim that change in similarity is consequential, influencing the manner in which people think and feel about partners. In two separate experiments we manipulated: a) time of assessment – participants rated a potential partner's attractiveness and trustworthiness following receipt of information about the partner at Time 1 and once again following the receipt of new information about the partner at Time 2; b) partner similarity – partner information was similar to versus dissimilar from the participant; c) change in similarity – similarity information about the partner either changed from Time 1 to Time 2 (toward similarity versus toward dissimilarity) or remained stable (similar at both times versus dissimilar at

both times); and d) sets of other traits – two different sets of traits about the other were presented to participants, in counterbalanced order. To ensure that all effects were attributable to similarity, both sets contained mildly positive traits. Importantly, in the two change conditions, we controlled for overall level of similarity (in both conditions, overall similarity-dissimilarity was 50-50).

We advanced several *a priori* hypotheses about the impact of change in similarity. First, we predicted a change effect of similarity information on attraction. This change effect should yield a three-way interaction of time of assessment by partner similarity by change in similarity. Within the change condition, change toward dissimilarity should reduce attraction whereas change toward similarity should increase attraction. Within the stable condition, we anticipated a simple main effect of similarity versus dissimilarity. Second, we predicted a dissimilarity-similarity asymmetry effect, such that within the change condition, change toward dissimilarity would more powerfully affect attraction than change toward similarity. Third, we predicted that findings for perceived partner trustworthiness would parallel those for attraction to the partner, and predicted that perceived trustworthiness would significantly mediate the impact of similarity on attraction.

We designed two studies to test our hypotheses. Both Study 1 and Study 2 directly test our predictions. Additionally, Study 2 examined the intrapersonal consequences of similarity by including a signal detection measure that tapped sensitivity to (changes in) similarity and dissimilarity, assessing the detection and recall of partner traits. Moreover, Study 2 examined whether our findings are meaningfully moderated by several potentially relevant personal dispositions (e.g., self-esteem, self-concept clarity), seeking to demonstrate that change in similarity affects interpersonal evaluations above and beyond individual differences. The present work thus extends the extant literature in three important respects. This is the first research to experimentally examine the interpersonal effects of change in similarity considering both relational (i.e., attraction and trust) and cognitive (i.e., trait detection) processes. Moreover, this work takes a detailed look at change in similarity by examining the possibility of stability versus change effects and the possibility of a dissimilarity-similarity asymmetry. Finally, present research tests the assertion that the

impact of new similarity information on interpersonal attraction rests on perceived partner trustworthiness.

### Study 1

Study 1 investigated the effects of change in partner similarity on subsequent affective evaluations of a partner. We employed a version of Byrne's (1971) bogus stranger paradigm in which participants received information about a partner at two times during the experiment – the partner was presented as similar versus dissimilar on one set of traits at Time 1, and was then presented as dissimilar versus similar on another set of traits at Time 2. To investigate whether similarity and dissimilarity information contribute equally to affective evaluations, we controlled for overall level of similarity within the two change conditions, holding the absolute number of similar and dissimilar traits constant. Specifically, in the change toward dissimilarity condition, at Time 1 partners had eight similar traits and four dissimilar traits, whereas at Time 2 partners had four similar traits and eight dissimilar traits; we employed the opposite pattern in the change toward similarity condition. Thus, in both change conditions partners shared half of the traits overall (i.e., 12 of 24) but the proportion of similar and dissimilar traits changed over time. In the stable similarity condition, partners shared a majority of the traits (i.e., 16 of 24) and in the stable dissimilarity condition, partners shared a minority of the traits (i.e., eight of 24). This paradigm allowed us to investigate the effects change in similarity, distinguishing between a) quantitative effects – effects attributable to overall amount of similarity, and b) qualitative effects – effects attributable to the social meaning of differing sequences of change. If similarity and dissimilarity information carry simple quantitative meaning, then Time 2 evaluations of partners should be identical in the change conditions (i.e., the absolute number of similar vs. dissimilar traits is identical). However, if similarity and dissimilarity carry differential meaning as a function of change, then Time 2 evaluations should differ for the change toward dissimilarity and change toward similarity conditions.

### Method

**Participants.** Eighty-six Dutch students (26 men, 60 women) participated in the study in exchange for monetary compensation of €3.50. Students were recruited on the campus of the VU University Amsterdam.

One participant did not understand the instructions, so his data were dropped from the analyses (his answer to the manipulation check differed by two standard deviations from the group mean). Thus, the analyses reported below are based on data from 85 participants (25 men, 60 women). Participants were 20.59 years old, on average ( $SD = 2.99$ ).

**Design.** The experiment was a 2 (time of assessment) x 2 (partner similarity at Time 1) x 2 (change in similarity) x 2 (trait order) design. *Time of assessment* was a within-participant variable. Participants rated the partner following receipt of trait information regarding the partner at Time 1 and following receipt of trait information regarding the partner at Time 2. The three between-participant variables were *partner similarity* (similarity vs. dissimilarity information), *change in similarity* (stability vs. change in (dis)similarity), and *trait order* (two different sets of traits were presented to participants in counterbalanced order).

**Procedure.** Upon arrival at the laboratory, participants were seated in separate cubicles and were randomly assigned to one of eight experimental conditions (more detailed description of the manipulations below). The experiment was presented on computers, programmed using Macromedia Authorware 7.0. Participants viewed a welcome screen and read general information about the experiment, which was described as an investigation of computer-mediated communication. Participants were informed that via the computer network, they would become acquainted with and interact with another participant. Participants then rated whether they possessed a first set of 12 traits (i.e., independent, sensible, emotional, communicative, spontaneous, intellectual, self-confident, perfectionist, calm, serious, proud, ambitious). Participants were told that the partner had provided parallel trait ratings, and received the (dis)similarity information regarding the partner. Specifically, to manipulate Time 1 similarity versus dissimilarity, participants learned that their partner had answered the majority versus the minority of the traits in the same way they had. To illustrate, independent of whether a participant rated themselves as proud, they learned that their partner had given the same answer for proud (for similarity) or a different answer for proud (for dissimilarity) (for more details see below). Participants then answered a manipulation check item and provided Time 1 ratings of the partner (i.e., attraction, perceived trustworthiness; described below). Then participants rated

whether they possessed a second set of 12 traits (i.e., open, generous, vigorous, flexible, thoughtful, assertive, conscientious, indulgent, unconventional, patient, creative, extravert). Again, they were told that their partner had provided parallel trait ratings, and received similarity information regarding the partner that was faked in such a manner as to manipulate Time 2 similarity vs. dissimilarity, thus creating partner's stability vs. change in similarity for details see below). Participants answered manipulation check items and provided Time 2 ratings of the partner (i.e., attraction, trustworthiness). Participants then responded to an open-ended question that probed for suspicion regarding our hypotheses ("What do you think was the purpose of the experiment?"). No participants guessed the true purpose of the experiment. At the end of the session, we explained that participants would not actually interact with the partner, provided debriefing information, and thanked and paid participants.

**Manipulating change and stability in similarity versus dissimilarity.** Participants received (dis)similarity information about their partners on two separate occasions (Times 1 and 2). As mentioned, we used two sets of 12 traits at Time 1 (e.g., proud, unconventional) and Time 2 (e.g., decisive, creative). These trait lists were pretested in a pilot study in which we asked 20 participants to rate the valence of 30 traits (0 = *very negative*, 8 = *very positive*). Based on these ratings, we selected those 24 traits that received moderate to positive mean ratings (*M*s ranged from 5.00 to 5.80). We selected moderate to positive traits to avoid traits which were very positive and on which similarity might be universally desired and generally negative traits on which similarity might be universally undesired. Factor analyses on the traits confirmed that for both sets of traits a one-factor structure emerged (explaining 77 % in the first set; and 61% of variance in the second set), suggesting that all traits tapped positive, desirable characteristics.

A similar-partner trait profile was created by informing a participant that their and their partner's answers to the traits were similar for eight traits and dissimilar for four traits; conversely, a dissimilar profile was created by informing a participant that their and their partner's answers to the traits were dissimilar for eight traits and similar for four traits. For example, participants received information that they and their partner responded the same way to "calm." Depending on whether partic-

participants indicated they possessed the trait or not, the similarity information could mean both that participants and their partner possessed the trait (i.e., calm), or that they both did not possess it. Thus, we never told participants whether the partner possessed a certain trait; we merely told them that the other gave the same or a different answer.

To create stability conditions, (dis)similarity information was held constant: for stable similarity - at Time 1 and Time 2 the partner's answer for eight traits was the same as the participant's and different for four traits on each trait list; and for stable dissimilarity - at Time 1 and Time 2 the partner's answer for four traits was the same as the participant's and different for eight traits on each trait list. To create change conditions, the proportion of similar and dissimilar information changed over time: for change toward dissimilarity - at Time 1 the partner's answer was the same as participant's for eight traits and different for four traits; at Time 2 the partner's answer was the same as participant's for four traits and different for eight traits; conversely, for change toward similarity—at Time 1 the partner's answer was the same as participant's for four traits and different for eight traits; at Time 2 the partner's answer was the same as participants' for eight traits and different for four traits.

**Manipulating trait order.** In addition to controlling for the traits' valence, we created two traits lists for the purpose of varying traits' depiction as similarities or dissimilarities. This way we controlled for the possibility that our effects might be driven by a similarity or a dissimilarity on a particular, rather than the overall perception of similarity or dissimilarity. To illustrate, depending on the trait order condition, the trait 'calm' would be depicted as one on which the participant and the partner answered the same or differently.

**Dependent variables.** At both Times 1 and 2 - following receipt of trait information about the partner - participants reacted to a manipulation check item and rated attraction to the partner and perceived partner trustworthiness. We included a one-item *similarity versus dissimilarity manipulation check* ("How similar is the partner?"; 0 = *not at all*, 8 = *very much*). We included a six-item measure of *attraction to the partner* (e.g., "I think I could really like this person"; 0 = *not at all*, 8 = *very much*;  $\alpha$  at Times 1 and 2 = .79 and .85). And we included a three-item measure of perceived partner trustworthiness (e.g., "I have a feeling that I

could count on this person”; 0 = *not at all*, 8 = *very much*;  $\alpha$ s at Times 1 and 2 = .71 and .80).

## Results

**Analysis strategy.** To examine the effects of change in similarity on our manipulation check and dependent variables, we performed 2 (time of assessment: Time 1 vs. 2) X 2 (partner similarity at Time 1: similarity vs. dissimilarity) X 2 (change in similarity: stability vs. change) X 2 (trait order: two counterbalanced orders of traits as similarities and dissimilarities) analyses of variance. Time of assessment was a within-participant variable and the remaining three factors were between-participant variables. We first examined overall main effects and interactions involving each independent variable, and then performed follow-up tests of simple effects to explore the form of significant interaction effects. Initial analyses revealed no significant main effects or interactions involving trait orders, so we dropped this variable from our analyses.

**Similarity manipulation check.** Consistent with expectations, the analysis performed on the similarity manipulation check revealed a significant three-factor interaction ( $F [1, 79] = 39.06, p < .01; \eta^2 = .33$ ). Follow-up tests revealed that within stability conditions there was a simple main effect of similarity, such that similarity ratings were significantly higher in the similarity condition than in the dissimilarity condition ( $F [1, 79] = 38.61, p < .01; \eta^2 = .32$ ; Time 1  $M$ s = 4.43 vs. 2.35 [ $SD$ s = 1.63 and 1.31] and Time 2  $M$ s = 4.43 vs. 2.25 [ $SD$ s = 1.21 and 1.45]). Within the change conditions, however, there was a significant interaction of time of assessment by partner similarity ( $F [1, 80] = 75.23, p < .01; \eta^2 = .48$ ). Follow-up tests examining the form of this interaction revealed that for change toward dissimilarity, similarity ratings decreased from Time 1 to Time 2 ( $F [1, 81] = 31.72, p < .01; \eta^2 = .28$ ; Time 1 and 2  $M$ s = 4.14 vs. 2.27 [ $SD$ s = 1.25 and 1.20]), whereas for change toward similarity, similarity ratings increased from Time 1 to Time 2 ( $F [1, 81] = 45.85, p < .01; \eta^2 = .36$ ; Time 1 and 2  $M$ s = 2.05 vs. 4.40 [ $SD$ s = 0.89 and 1.46]). Thus, our similarity manipulations created the intended conditions.

**Attraction to the partner.** Consistent with expectations, the analysis on our measure of attraction to the partner revealed a significant three-factor interaction ( $F [1, 79] = 10.66, p < .01; \eta^2 = .12$ ). As antic-

ipated, follow-up tests revealed that within the stability conditions there was a simple main effect of similarity, such that attraction to the partner was significantly higher in the similarity condition than in the dissimilarity condition ( $F [1, 80] = 4.39, p < .05; \eta^2 = .05$ ; for the similarity and dissimilarity conditions, Time 1  $M_s = 5.10$  vs.  $4.56$  [ $SDs = 0.99$  and  $1.14$ ] and Time 2  $M_s = 4.69$  vs.  $4.10$  [ $SDs = 0.80$  and  $1.08$ ]). However, within the change conditions there was a significant interaction of time of assessment by partner similarity ( $F [1, 80] = 21.89, p < .01; \eta^2 = .21$ ). Follow-up tests revealed that for change toward dissimilarity, attraction to the partner decreased significantly from Time 1 to Time 2 ( $F [1, 81] = 20.62, p < .02; \eta^2 = .20$ ), whereas for change toward similarity, attraction to the partner increased marginally from Time 1 to Time 2 ( $F [1, 81] = 3.34, p < .07; \eta^2 = .04$ ). Moreover, results provide support for the hypothesized dissimilarity-similarity asymmetry effect, in that change toward dissimilarity exerted a greater impact on participants' ratings of partner attractiveness than change toward similarity (as reported above, respective  $F [1, 81] = 20.62, \eta^2 = .20$  vs.  $F [1, 81] = 3.34, \eta^2 = .04$ ).

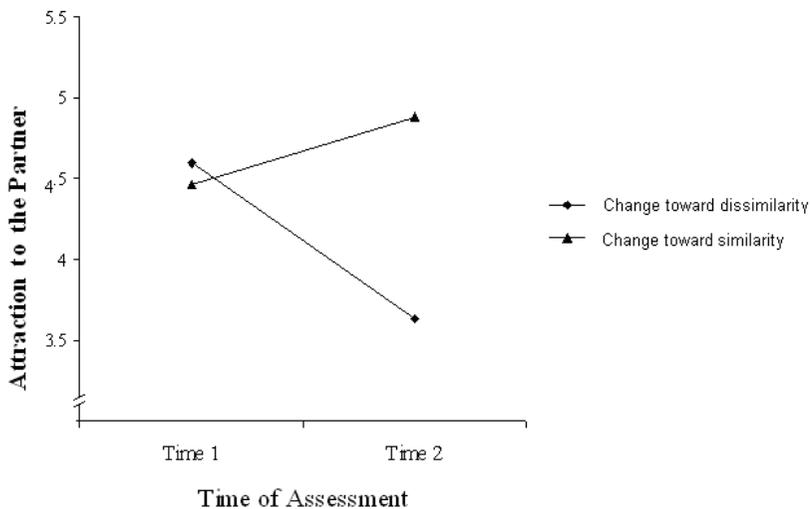


Figure 1. Mean attraction at Times 1 and 2 for the two change conditions.

**Mediation by perceived partner trustworthiness.** As predicted, the analysis performed on perceived partner trustworthiness revealed a parallel pattern. The three-factor interaction was significant ( $F [1, 79] =$

7.77,  $p < .01$ ;  $\eta^2 = .09$ ). Follow-up tests revealed a significant interaction of time of assessment by partner similarity within the change in similarity conditions ( $F [1, 80] = 13.34$ ,  $p < .01$ ;  $\eta^2 = .14$ ), such that a) for change toward similarity, perceived partner trustworthiness increased from Time 1 to Time 2 ( $F [1, 81] = 5.96$ ,  $p < .02$ ;  $\eta^2 = .07$ ), whereas b) for change toward dissimilarity, perceived trustworthiness decreased from Time 1 to Time 2 ( $F [1, 81] = 7.53$ ,  $p < .01$ ;  $\eta^2 = .09$ ).

To test for mediation, we regressed the Time 2 measure of a given criterion onto partner similarity, change in similarity, and the interaction of these variables, controlling for the level of the criterion at Time 1. Given that these analyses examined effects on Time 2 criteria controlling for Time 1 levels of the criterion, they assess change over time in a given variable. In this residualized lagged analysis, the key effect for assessing mediation is the two-factor interaction of partner similarity by change in similarity. The prerequisites for mediation were met (Baron & Kenny, 1986): a) an analysis regressing Time 2 perceived trustworthiness onto partner similarity, change in similarity, and their interaction, controlling for Time 1 perceived trustworthiness revealed a significant interaction of partner similarity by change in similarity ( $\beta = .60$ ,  $p < .01$ ); b) an analysis regressing Time 2 attraction onto partner similarity, change in similarity, and their interaction, controlling for Time 1 attraction revealed a significant interaction of partner similarity by change in similarity ( $\beta = .68$ ,  $p < .01$ ); and c) an analysis regressing Time 2 attraction onto Time 2 perceived trustworthiness, controlling for Time 1 perceived trustworthiness revealed a significant effect of change in trustworthiness (i.e., Time 2 trustworthiness, controlling for Time 1 trustworthiness;  $\beta = .57$ ,  $p < .01$ ).

Finally, when we regressed Time 2 attraction onto partner similarity, change in similarity, their interaction, *and* Time 1 and 2 perceived trustworthiness, controlling for Time 1 attraction, we found that the effect of partner similarity by change in similarity was reduced ( $\beta = .46$ ,  $p < .01$ ). A Sobel's test revealed that change in perceived partner trustworthiness significantly – albeit partially – mediated the impact of similarity change on change in attraction ( $z = 2.98$ ,  $p < .01$ ).

### Discussion

Findings from Study 1 are consistent with the hypothesis that change in similarity affects relationship development. Feelings of attrac-

tion and trustworthiness are not unalterably shaped by initial information regarding partner similarity. Change toward dissimilarity reduced attraction and trustworthiness, whereas change toward similarity increased attraction and trustworthiness. Hence, stability did not uniquely produce the highest level of attraction and trust. Rather, it was the new information that mostly affected people's feelings toward their partner. Study 1 also revealed dissimilarity-similarity asymmetry. New dissimilarity information reduced attraction more than new similarity information increased attraction. These findings are particularly striking given that we controlled for overall level of similarity within the two change conditions. In both conditions, partners shared 12 of 24 similar traits. Thus, people's feelings of attraction and trust are not a simple quantitative function of partners' overall degree of similarity. Our results also demonstrated that the effect of similarity on attraction is mediated by trustworthiness. Change in similarity influences attraction to a partner in part because it affects the perception of that person's trustworthiness, which in turn affects feelings of attraction to the person. Thus, Study 1 served as the first test of whether partner similarity effects may be attributable to the fact that partner similarity – or shared traits – communicates trustworthiness.

### Study 2

Importantly, it aimed to shed more light on the processes underlying the observed effect of change in similarity on attraction and trust. We investigated whether participants' recall of partner similarity information is biased. We asked participants to complete a memory recognition task following the presentation of partner similarity at Times 1 and 2. This approach allowed us to assess the accuracy with which people distinguish between similarities versus dissimilarities. We employed signal detection analysis to establish response bias in people's perception of their partner (Snodgrass & Corwin, 1988). *Liberal bias* describes the perceptual pattern exhibited by people whose goal is to establish similarities. People showing a liberal bias tend to recall a given partner trait as similar when insecure. In contrast, *conservative bias* describes the pattern exhibited by people whose goal is to establish dissimilarities. People showing a conservative bias tend to recall a given partner trait as dissimilar when insecure. People whose goal is to accurately process information would not

show bias in either direction, indicating that they accurately recall partner traits as similar versus dissimilar.

Thus, the signal detection task allowed us to examine whether the majority feature of a given partner profile (i.e., similarity vs. dissimilarity) colours participants' perception of the partner. We hypothesized that majority similarity and dissimilarity information, as presented at each time, should lead to specific biases. First, similarity information should colour participants' perception toward seeing the partner as similar even when he or she is not (i.e., a liberal bias). Second, dissimilarity information should colour participants' perception toward seeing the partner as dissimilar even when he or she is not (i.e., a conservative bias). Indirect support for our hypothesis comes from research by Norton and colleagues (Norton, Frost, & Ariely, 2007), which shows that when traits are presented in sequence, a first dissimilar trait changes the way people perceive the rest of the traits, in that later traits are more likely to be seen as dissimilarities.

In Study 2 we also examined the impact of several personal dispositions that might plausibly moderate our findings. First, we examined self-esteem in order to rule out self-verification explanations of our findings. Specifically, if our findings were driven by desire for self-verification, we should find that positive evaluations of similar others are limited to people with high self-esteem (cf. Swann, De La Ronde, & Hixon, 1994). Second, we examined clarity of self-concept to explore whether perceived similarity might yield benefits primarily to the extent that people have well-articulated self-concepts (e.g., they "know who they are, and what they want"; cf. Campbell, 1990). Third, we examined attachment orientation to explore whether the benefits of perceived similarity are limited to anxious individuals' pronounced desire to seek proximity, reassurance, and safety (cf. Mikulincer & Shaver, 2003). Finally, we examined the effect of mood to rule out the possibility that our findings are driven by a simple positivity or negativity effect (e.g., own positive vs. negative mood serves as a simple affective response to the target; cf. Schwarz & Clore, 1983).

### **Method**

**Participants.** Eighty-one Dutch students (29 male, 52 female) participated in the study in exchange for monetary compensation of €3.50.

Students were recruited on the campus of the VU University Amsterdam. One participant did not understand the instructions, so his data were dropped from the analyses (his answer to the manipulation check differed by two standard deviations from the group mean). The analyses reported below are based on data from 80 participants (28 male, 52 female). Participants were 20.30 years old, on average ( $SD = 2.64$ ).

### Design

As in Study 1, the design was a 2 (time of assessment: Time 1 vs. Time 2)  $\times$  2 (partner similarity at Time 1: similarity vs. dissimilarity information)  $\times$  2 (change in similarity: stability vs. change)<sup>2</sup>. Time of assessment was a within-participant variable, and partner similarity, change in similarity, and trait order were between-participant variables.

**Procedure.** Study 2 followed the procedure of Study 1, with the following exceptions. First, at the beginning of the experiment participants completed questionnaires that assessed several dispositions that might moderate the effects of similarity change. We assessed *self-esteem* using Rosenberg's (1965) 10-item instrument (e.g., "I feel that I am a person of worth, at least on an equal basis with others"; for all items, 0 = *do not agree at all*, 8 = *agree completely*;  $\alpha = .70$ ), we assessed *self-concept clarity* using Campbell's (1990) 12-item instrument (e.g., "I spend a lot of time wondering about what kind of person I really am";  $\alpha = .77$ ), and we assessed *attachment orientation* using a modified, 18-item version of the Fraley, Waller, and Brennan (2000) ECR instrument (e.g., for anxiety, "People are never there when you need them"; for avoidance, "I find it is easy to get close to others";  $\alpha$ s = .74 and .73). Finally, we assessed *mood* using the Watson, Clark, and Tellegen (1988) 20-item instrument (e.g., "I feel proud now";  $\alpha = .75$ ). Second, we used a signal detection task to examine how people process similarity information (Faddegon, Scheepers, & Ellemers, 2007). Participants completed this at Times 1 and 2, after completing attraction and trustworthiness measures. They reported for each of the 12 traits on a list whether the partner was similar to themselves (yes vs. no). As in Study 1, our measures of attraction to the partner (Time 1 and 2  $\alpha$ s = .73 and .77) and perceived partner

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<sup>2</sup> As in Study 1, we included trait order, as a between-subject variable. Again, initial analyses revealed no significant main effects or interactions involving trait order, so we dropped this variable from our analyses.

trustworthiness (Time 1 and 2  $\alpha$ s = .71 and .78) exhibited good reliability. Finally as in Study 1, participants also responded to an open-ended question that probed for suspicion; no participants guessed the true purpose of the experiment.

**Assessing response bias.** To assess the accuracy with which participants discern the presence versus absence of similarity, responses to the signal detection task were coded as hits, misses, correct rejections, or false alarms. If a trait was presented as similar and participants recognized it as such, the response was coded as a *hit*. If participants incorrectly rated the trait as dissimilarity, it was coded as a *miss*. If a trait was presented as dissimilar and participants recognized it as such, the response was coded as a *correct rejection*. If participants incorrectly rated the trait as a similarity, it was coded as a *false alarm*. To calculate response bias at Times 1 and 2, we applied the two-high threshold model (Snodgrass & Corwin, 1988) – mathematically,  $p(\text{False Alarm}) / (1 - p(\text{Hit}) + p(\text{False Alarm}))$ . Conceptually, bias represents the extent to which people are motivated to insure hits and avoid misses, versus the extent to which they are motivated to insure correct rejections and avoid false alarms (Faddegon, Scheepers, & Ellemers, 2007). In our work, response bias describes the extent to which people are motivated to a) correctly report similarities (hits) and avoid falsely reporting a trait as a similar when it is dissimilar (misses), versus b) correctly report dissimilarities (correct rejections) and avoid falsely reporting a trait as dissimilar when it is similar (false alarms). Higher values of response bias (above .50) indicate liberal bias, or motivation to identify similarities; lower values (below .50) indicate conservative bias, or motivation to identify dissimilarities.

## Results

**Analysis strategy.** As in Study 1, we examined main effects and interactions in the context of our  $2 \times 2 \times 2 \times 2$  design, followed by tests of simple effects to explore the form of any significant interactions. As in Study 1, there were no significant main effects or interactions involving trait order, so we dropped this variable from our analyses.

**Similarity manipulation check.** The analysis performed on the similarity manipulation check revealed a significant three-factor interaction of time of assessment by partner similarity by change in similarity ( $F$

[1, 76] = 27.57,  $p < .01$ ,  $\eta^2 = .27$ ). Follow-up tests confirmed that a) within the stability conditions there was a simple main effect of similarity, such that similarity ratings were higher in the similarity condition than in the dissimilarity condition ( $F [1, 76] = 12.11$ ,  $p < .01$ ,  $\eta^2 = .14$ ; Time 1  $M_s = 4.24$  vs. 2.79 [ $SD_s = 1.76$  and 1.40] and Time 2  $M_s = 3.95$  vs. 2.52 [ $SD_s = 1.91$  and 1.50]), whereas b) within the change in conditions there was a significant interaction of time of assessment by partner similarity ( $F [1, 77] = 53.27$ ,  $p < .01$ ;  $\eta^2 = .41$ ). Follow-up tests revealed that a) for change toward dissimilarity, similarity decreased from Time 1 to Time 2 ( $F [1, 78] = 39.70$ ,  $p < .01$ ,  $\eta^2 = .34$ ; Time 1 and 2  $M_s = 4.75$  vs. 2.35 [ $SD_s = 1.48$  and 1.39]), whereas b) for change toward similarity, similarity ratings increased from Time 1 to Time 2 ( $F [1, 78] = 18.76$ ,  $p < .01$ ,  $\eta^2 = .19$ ; Time 1 and 2  $M_s = 2.60$  vs. 4.25 [ $SD_s = 1.39$  and 1.55]). Thus, our manipulations created the intended conditions.

**Attraction to partner.** Replicating Study 1, the analysis on attraction to the partner revealed a significant three-factor interaction ( $F [1, 76] = 13.11$ ;  $p < .01$ ;  $\eta^2 = .15$ ). Follow-up tests revealed that a) within the stability conditions there was a simple main effect of similarity, such that attraction was higher in the similarity condition than in the dissimilarity condition ( $F [1, 77] = 12.69$ ,  $p < .01$ ,  $\eta^2 = .14$ ; for the similarity and dissimilarity conditions, Time 1  $M_s = 5.02$  vs. 4.11 [ $SD_s = 1.26$  and 0.84] and Time 2  $M_s = 4.99$  vs. 3.95 [ $SD_s = 1.12$  and 0.81]). However, within the change in similarity condition there was a significant interaction of time of assessment by partner similarity ( $F [1, 80] = 22.44$ ,  $p < .01$ ,  $\eta^2 = .23$ ). Follow-up tests within the change condition revealed that a) for change toward dissimilarity, attraction decreased from Time 1 to Time 2 ( $F [1, 78] = 34.92$ ,  $p < .01$ ,  $\eta^2 = .31$ ), and b) for change toward similarity, attraction increased from Time 1 to Time 2 ( $F [1, 78] = 9.07$ ,  $p < .02$ ,  $\eta^2 = .10$ ). Moreover, the form of the three-factor interaction was consistent with the predicted dissimilarity-similarity asymmetry effect, in that change toward dissimilarity exerted a greater impact on attraction than change toward similarity (as reported above,  $F [1, 78] = 34.92$ ,  $\eta^2 = .31$  vs.  $F [1, 78] = 9.07$ ,  $\eta^2 = .10$ ). Mean attraction scores for the two change conditions are displayed in Figure 2.

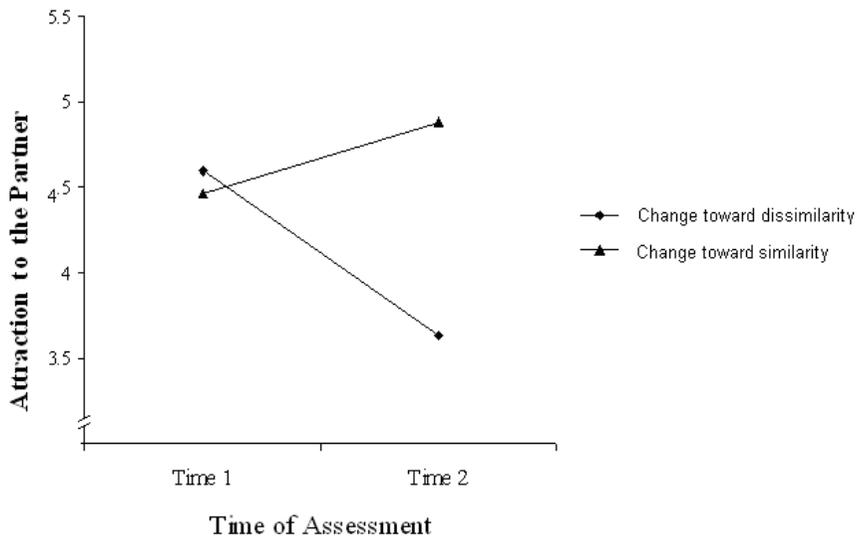


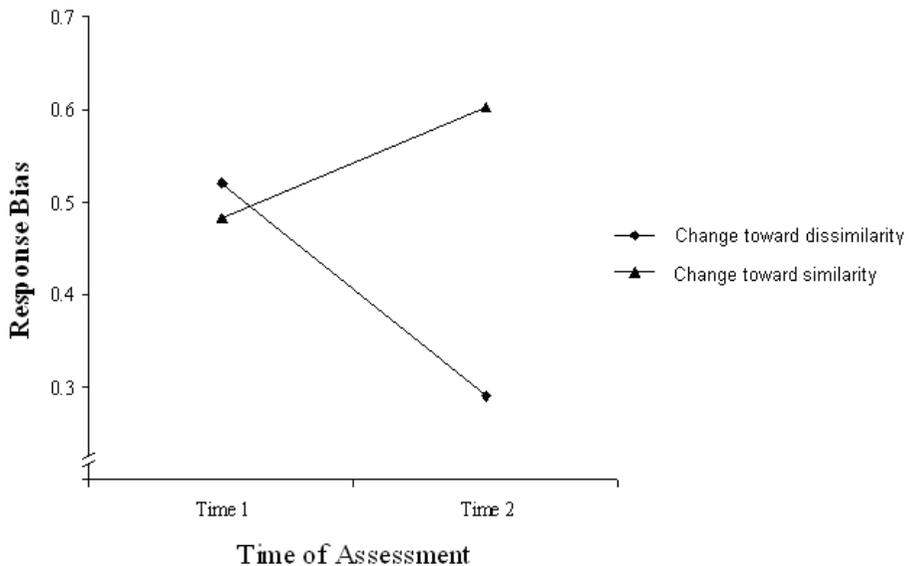
Figure 2. Mean attraction at Times 1 and 2 for the two change conditions.

**Mediation by perceived partner trustworthiness.** The analysis performed on perceived partner trustworthiness revealed a parallel pattern. The three-factor interaction of time of assessment by partner similarity by change in similarity was significant ( $F [1, 76] = 13.78, p < .01; \text{p}\eta^2 = .15$ ). Follow-up tests revealed a significant interaction of time of assessment by partner similarity within the change condition ( $F [1, 80] = 21.89; p < .01, \text{p}\eta^2 = .22$ ), such that a) within the change toward dissimilarity condition, perceived trustworthiness decreased from Time 1 to Time 2 ( $F [1, 78] = 32.38; p < .01, \text{p}\eta^2 = .29$ ), whereas b) within the change toward similarity condition, perceived trustworthiness increased from Time 1 to Time 2 ( $F [1, 78] = 35.67; p < .01, \text{p}\eta^2 = .31$ ).

We tested for mediation as in Study 1. The prerequisites for assessing mediation were met: a) an analysis regressing Time 2 perceived trustworthiness onto partner similarity, change in similarity, and the interaction of these variables, controlling for Time 1 perceived trustworthiness revealed a significant interaction of partner similarity by change in similarity ( $\beta = .62, p < .01$ ); b) an analysis regressing Time 2 attraction onto partner similarity, change in similarity, and their interaction, controlling for Time 1 attraction revealed a significant interaction of partner similarity by change in similarity ( $\beta = .72, p < .01$ ); and c) an analysis

regressing Time 2 attraction onto Time 2 perceived partner trustworthiness, controlling for Time 1 perceived trustworthiness revealed a significant effect of change in trustworthiness (i.e., Time 2 trustworthiness, controlling for Time 1 trustworthiness  $\beta = .55, p < .01$ ). When we regressed Time 2 attraction onto partner similarity, change in similarity, their interaction, *and* Time 1 and 2 perceived trustworthiness, controlling for Time 1 attraction, we found that the interaction of partner similarity by change in similarity was reduced ( $\beta = .41, p < .01$ ). Replicating Study 1, change in perceived trustworthiness significantly – albeit partially – mediated the impact of similarity change on change in attraction ( $z = 3.33, p < .01$ ).

**Response bias.** The analysis on participants' response bias scores revealed a significant three-factor interaction ( $F [1, 76] = 11.17, p < .01, p\eta^2 = .13$ ). Follow-up tests revealed that within the stability condition there was a simple main effect of similarity, such that participants in the similarity condition exhibited a liberal response bias, while participants in the dissimilarity condition displayed a slightly conservative bias ( $F [1, 80] = 4.39, p < .05; p\eta^2 = .05$ ; for the similarity and dissimilarity conditions, Time 1  $M$ s = 0.62 vs. 0.44 [ $SD$ s = 0.19 and 0.19] and Time 2  $M$ s = 0.62 vs. 0.43 [ $SD$ s = 0.18 and 0.20]). Within the change condition there was a significant interaction of time of assessment by partner similarity ( $F [1, 77] = 21.75, p < .01, p\eta^2 = .22$ ). Follow-up tests revealed that a) for change toward dissimilarity, response bias decreased from Time 1 to Time 2 – shifting from a liberal to a conservative bias ( $F [1, 78] = 18.98, p < .01, p\eta^2 = .20$ ), whereas b) for change toward similarity, response bias increased from Time 1 to Time 2 - shifting from a conservative to a liberal bias ( $F [1, 78] = 5.32, p < .05, p\eta^2 = .06$ ). The form of the interaction within the change condition was consistent with the hypothesized dissimilarity-similarity asymmetry effect. Change toward dissimilarity affected response bias more than change toward similarity (as reported above:  $F [1, 78] = 18.98, p\eta^2 = .20$  vs.  $F [1, 78] = 5.32, p\eta^2 = .06$ ). Mean response bias scores for the two change conditions are displayed in Figure 3. Interestingly, response bias scores were not significantly correlated with the attraction or trust measures, suggesting that the cognitive, intra-personal effects of similarity are independent from the affective, relational ones.



*Figure 3.* Mean response bias at Times 1 and 2 for the two change conditions.

**Moderation by personal dispositions or mood?** Finally, we examined whether our findings are moderated by personal dispositions or mood. To explore this possibility, we replicated the above-reported analyses of variance for each of our dependent variables – attraction, perceived trustworthiness, and response bias – adding to each analysis, in turn, main effects and interactions for self-esteem, clarity of self-concept, attachment orientation (both anxious attachment and avoidant attachment), and mood. Out of a total of 60 possible effects involving these five variables (15 main effects, 45 interactions), no effects were statistically significant. Thus, our findings were not meaningfully moderated by any of the assessed dispositions or by participant mood.

### Discussion

Findings from Study 2 replicated those of Study 1. We observed a change effect, whereby attraction and perceived trustworthiness are consistent with the new similarity information, rather than the overall level of similarity. In addition, change to dissimilarity caused a greater reduction in attraction than change to similarity caused an increase in attraction, thus replicating the Study 1 dissimilarity-similarity asymmetry effect. Moreover, we once again found that perceived trustworthiness me-

diated the association of change in similarity with attraction. The results of Study 2 also extend our understanding of change in similarity by demonstrating the dynamics of similarity detection. As predicted new similarity information influenced cognitive processing of similarity information, in so that the majority feature of new information coloured the recall of similarities and dissimilarities. Namely, for change toward dissimilarity participants initially exhibited liberal bias – a tendency to perceive similarities even if such similarities did not exist – and then exhibited a conservative bias – a tendency to perceive dissimilarities even if such dissimilarities did not exist. The opposite pattern emerged for change toward similarity. In addition, findings for response bias also exhibited dissimilarity-similarity asymmetry – change toward dissimilarity yielded greater overestimation of dissimilarities than change toward similarity yielded overestimation of similarities. The fact that the response bias was unrelated to feelings of attraction and trustworthiness suggests that similarity effects operate independently on cognitive (i.e., response bias) and relational processes (i.e., attraction and trust). Finally, Study 2 reveals that the effects of similarity change operate above and beyond several potentially relevant personal dispositions and mood.

### **General Discussion**

The present work extended our understanding of the similarity-attraction effect by investigating how change in similarity affects attraction and perceptions of trustworthiness. We also examined whether such change is governed by dissimilarity-similarity asymmetry, such that the impact of change toward dissimilarity (versus stable dissimilarity) is more deleterious than the impact of change toward similarity (versus stability) is beneficial. Importantly, we tested one possible mechanism by which change in similarity affects attraction - via its impact on perceived partner trustworthiness. Finally, we investigated the cognitive processing of similarity information. This work thereby extends our knowledge of the role that change in similarity plays in shaping developing relationships.

### **Similarity and Similarity Change in Interpersonal Relationships**

Replicating earlier findings regarding the similarity-attraction effect (Byrne, 1971), our work once again demonstrated that similarity causes enhanced attraction. In an important extension of earlier findings, our

work revealed that analogically to a recency effect in impression formation (e.g., Denrell, 2005), similarity information, too, is processed in an ongoing manner – new information overshadows initial information. These findings are particularly striking in that we controlled for the overall level of partner similarity. In both change conditions participants confronted partners who possessed the same number of similar versus dissimilar traits. The fact that people continue to monitor similarity information as a relationship develops is crucial for our understanding of how relationships unfold. An increase in similarity increases desire for closeness to another, whereas a decrease in dissimilarity decreases desire for closeness.

Our work also demonstrates that change toward dissimilarity is more harmful than change toward similarity is beneficial. Thus, similarity information is processed in a fashion that parallels how we process positive and negative information, according to a positive-negative asymmetry effect (e.g., Baumeister et al., 2001). It is important to underline that this dissimilarity-similarity asymmetry effect cannot be attributed to the positivity versus negativity of the partner traits. We used only moderately positive traits and we varied the order of two trait orders, which had no impact on our findings. These findings indicate that even positive information about a partner may have harmful effects when it signals dissimilarity.

Our work also extends the extant literature by demonstrating that people are cognitively responsive to changes in partner similarity. Consistent with the predicted dissimilarity-similarity asymmetry effect the conservative bias caused by change toward dissimilarity was more pronounced than the liberal bias caused by change toward similarity. We speculate that people are more strongly motivated to eschew dissimilarity than to confirm similarity because dissimilarity information signals social, affective, and behavioural risk (e.g., Murray et al., 2006). Indeed, a cognitive sensitivity to dissimilarity may have adaptive value, because it helps people avoid the risks associated with becoming dependent on another. Because this cognitive processing was unrelated to attraction and trust, more research is needed to illuminate the interaction between intra- and interpersonal effects of changes in similarity.

### **Similarity as a Signal of Trustworthiness**

Our work also highlights the importance of trust in promoting attraction during the initial stages of a relationship. Our findings support our proposition that during initial interactions, change in similarity is diagnostic, and thus consequential, for developing feelings of trust between partners. Partners who change toward dissimilarity are perceived as untrustworthy, which in turn causes reduced attraction; partners who change toward similarity are perceived as trustworthy, which in turn causes enhanced attraction. Trust is a core feature of relationships (Cottrell et al., 2007), essential for reciprocity of attraction (Montoya & Insko, 2008), embodying the perception that a partner is reliable, predictable, and can be relied upon to be responsive to one's needs (Holmes & Rempel, 1989). Our findings are consistent with the claim that similarity may promote trust because it triggers feelings of familiarity (Park & Schaller, 2005). Because we assume that similar others understand and accept our needs and desires, we feel at ease with them, comfortable in the conviction they can be trusted to respond to our needs.

This “warm and fuzzy” feeling of trust – a feeling produced by high similarity, or shared traits – partially mediates the impact of change in similarity on attraction. Why is the similarity-attraction association not completely mediated by trust? Presumably, other mechanisms shape this association. For example, similarity may communicate partner acceptance of the self, which may reduce the risks associated with increasing attraction and dependence (Murray et al., 2006). Also, similarity and attraction can mutually influence each other: An increase in similarity increases attraction and an increase in attraction increases the perception of similarity (Morry, 2005). Additionally, the similarity-attraction link has been shown to be mediated by respect rather than trust, depending on the type of the similar traits (Singh, et al., 2009). Future work should continue to examine the different processes underlying the association between similarity, trust, and attraction, in the dynamic context of similarity change.

Our findings are especially interesting in the light of expectancy violation theory, which asserts that violated expectancies yield negative affective responses (Burgoon, LePoire, & Rosenthal, 1995). In our work, negative affective responses – such as feelings of mistrust and reduced attraction – were not limited to partners who disconfirmed expectancies.

Partners who confirmed negative expectancies by sustaining dissimilarity produced mistrust and disliking. Conversely, partners who disconfirmed expectancies by changing toward similarity actually promoted positive affective responses, in the form of enhanced trust and attraction. These findings suggest that, at least during the early stages of relationships, interpersonal judgments are sufficiently flexible that we detect and process cues that signal the future success versus failure of a relationship. Partner similarity appears to be one such cue.

### **Strengths and Limitations**

Before closing, we should comment on some of the most important strengths of this work. One strong point of the present research is that we employed the classic bogus stranger paradigm to experimentally study the impact of change over time in partner similarity versus dissimilarity. Both studies confirmed the existence of a change effect and a dissimilarity-similarity asymmetry effect. Our confidence in the differential impact of differing patterns of change is enhanced by the fact that we made use of pretested traits with moderate to positive valence, counterbalanced for the order in which participants encountered each set of traits, and – importantly – controlled for the absolute number of similar and dissimilar traits in the two change conditions. Finally, this work extends our understanding of the classic similarity-attraction effect by identifying an important underlying mechanism for such an association, perceived partner trustworthiness.

Several limitations should also be identified. First, we examined evaluations of complete strangers. Hence, the effects observed in the present work might be mitigated in ongoing relationships. For example, highly committed people seem to be able to protect their relationships in times of adversity (Lydon, Meana, Sepinwall, Richards, & Mayman, 2007), thus such partners may be less vulnerable to the threat of emerging partner dissimilarity. Present research supports the view that actual similarity is important in building interpersonal bonds. The importance of similarity has been established by a number of studies (e.g., Byrne, 1971, Klohnen & Luo, 2003), however the degree to which actual similarity affects relationships is still controversial in the literature. For instance, Lykken and Tellegen (1993) show that actual similarity between spouses does not strongly influence mate selection. The present research ex-

amines similarity in the context of initial interactions and shows that actual similarity is influential in such situations, however it is likely that when interactions lead to relationship development actual similarity might be replaced by for instance perceived similarity (Montoya, Horton, & Kirchner, 2009). In addition, we did not assess the importance of the traits for which a partner exhibited similarity versus dissimilarity. Traits differ in the degree to which they are central versus peripheral to the self (Sedikides, 1995), or even to one's relationship (Gill & Swann, 2004). It is possible that change in similarity with respect to central traits exerts a greater impact on subsequent interaction than change with respect to peripheral traits.

### **Conclusions**

The overarching goal of the present work was to explore the effect of change in partner similarity in its effect on affective and cognitive processes. We proposed that similarity and dissimilarity information carry more than simple quantitative meaning. Two experiments revealed findings consistent with the prediction that such information carries differential meaning as a function of differing sequences of change. Discovering new partner similarities causes increased attraction and perceived trustworthiness, whereas discovering new partner dissimilarities causes reduced attraction and perceived trustworthiness. Moreover, this work shows the existence of dissimilarity-similarity asymmetry, demonstrating that change toward dissimilarity is more damaging than change toward similarity is beneficial to relationships. Such differential damage was evident not only for attraction and perceived trustworthiness, but also for an important cognitive process – the detection and recall of partner similarities and dissimilarities. Perhaps most importantly, this work reveals that partner similarity – or the perception of shared traits – carries broader symbolic meaning, communicating the “warm and fuzzy” feeling of partner trustworthiness, which in turn plays an important role in mediating effects on attraction. As such, this work extends our understanding one of the most well-established empirical regularities in the field – Byrne's (1971) classic similarity-attraction effect.



## **Chapter 3:**

### **When Anyone Will Do:**

### **Anxiety Eliminates People's Preference for Similar over Dissimilar Others<sup>1</sup>**

People are generally more attracted to others who are similar rather than dissimilar to the self (Byrne, 1971). The present authors hypothesized that anxiety may attenuate such similarity-attraction effects by disrupting access to people's intuitive preferences. In line with this, the effects of similarity on self-reported attraction were observed among low-anxious, but not among high-anxious participants (Studies 1-4). Anxiety did not reduce the impact of similarity on attraction for implicit measures, indicating that anxious participants retained an intuitive preference for similar over dissimilar others (Study 2). Similarity-attraction effects among low-anxious participants were reduced by explanatory introspection (Study 3). Similarity-attraction effects were increased by global perceptual focus (Study 4). These findings suggest that anxiety may reduce similarity-attraction effects by promoting a narrow cognitive set that impairs access to intuitive preferences. More generally, the present research highlights the significance of anxiety in interpersonal interaction.

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<sup>1</sup>**This chapter is based on:** Kubacka, K..E., Koole, S.L., & Finkenauer, C. (2010). *When anyone will do: Anxiety eliminates people's preferences for similar over dissimilar others*. Manuscript submitted for publication.

On April 15, 1974, a San Francisco bank was robbed by a band of five young people carrying machine guns. Notable among these five was Patricia Hearst, a Berkley student and heiress to the William Randolph Hearst media empire. Kidnapped months earlier by an urban guerrilla group known as the Symbionese Liberation Army (SLA), Hearst had joined her captors in furthering their cause. Hearst was arrested a year later along with other SLA members, and subsequently distanced herself from the SLA. During her trial, Hearst's attorneys argued that she had suffered from the so-called Stockholm syndrome, in which hostages develop positive feelings towards their captors (for detailed histories, see Ewing & McCann, 2006; Graeber, 2008).

Since the classic work of Stanley Schachter (1959), psychologists have demonstrated time and again that anxiety-provoking conditions can increase interpersonal affiliation (e.g., Dutton & Aron, 1974; Mikulincer & Shaver, 2003; Taylor, 2006). But what makes the Hearst case is particularly provocative is that Patricia Hearst, a student at a prestigious university and member of one of the USA's richest families, became temporarily attracted to a group of political extremists. A group with whom she seemed to have almost nothing in common. This is remarkable in view of substantial empirical evidence that people usually gravitate towards individuals who are similar to themselves (Byrne, 1971; Montoya, Horton, & Kirchner, 2008). Could it be that anxiety leads people to become attracted even to dissimilar others? If so, the intriguing possibility arises that anxiety changes the processes that underlie interpersonal attraction, instead of merely raising the quantity of interpersonal attraction.

The present research further investigates the role of anxiety in attraction towards others who are similar or dissimilar to self. In line with previous work, we assume that similarity to self automatically triggers positive feelings towards a person, which are experienced intuitively as a preference for similar over dissimilar others (see Jones, Pelham, Carvalho, & Mirenberg, 2004). We further propose that anxiety may interfere with people's cognitive access to their intuitive preferences, and thus lead to equally high levels of attraction towards others who are similar and others who are dissimilar to self. In what follows, we briefly review the literature on the effects of similarity on interpersonal attraction. Next, we

consider the rationale for predicting that anxiety may reduce or eliminate the effects of similarity on attraction. Finally, we present four studies that empirically investigated the impact of anxiety on attraction towards others similar or dissimilar to self.

### **From Similarity to Attraction**

A classic longitudinal study demonstrated that similarity is a potent determinant of attraction among housemates who were initially strangers to each other (Newcomb, 1961). Building on these findings, Byrne (1971) developed the "bogus stranger" paradigm, in which participants' similarity to a stranger can be systematically varied. Research using this paradigm has confirmed that attraction tends to be a linear function of attitudinal similarity (Byrne, 1971; Byrne & Nelson, 1965; for a meta-analysis, see Montoya et al., 2008). This *similarity-attraction effect* occurs also for similarity in sex-role expectations (Ickes & Barnes, 1978), role performance expectations and interests (Houts, Robins, & Huston, 1996), and personality styles (Klohnen & Luo, 2003) and may enhance empathy (Batson, Duncan, Ackerman, Buckley, & Birch, 1981; Krebs, 1975), trust (Kubacka, Finkenauer, & Rusbult, 2010), and helping behavior (Burger, Soroka, Gonzago, Murphy, & Somervell, 2001; Park & Schaller, 2005). As relationships endure, the effects of actual similarity may be increasingly outweighed by perceived similarity between self and other (Montoya et al., 2008). Thus, the similarity-attraction effect seems to matter particularly for initiating relationships.

The cognitive mechanisms that underlie the similarity-attraction effect are not yet fully understood. The effect may arise in part because people expect to be liked more by similar others than by dissimilar others (Condon & Crano, 1988; Walster & Walster, 1963). There are indications, however, that the similarity-attraction effect is also driven by more intuitive or implicit affective processes. Early work by Clore and Byrne (1974) suggested that similarity is reinforcing, by automatically triggering positive affective associations. More recently, Park and Schaller (2005) have shown that attitudinal similarity is implicitly associated with kinship cognitions (e.g., words like brother or sister), especially among individuals who strongly trust their intuition. In a related vein, Kubacka et al. (2010, Study 2) found that, in addition to a robust similarity-attraction effect, people displayed systematic memory biases, sometimes

remembering similarities and at other times dissimilarities where these did not exist. In as far as such memory biases are likely to be unintentional, they point to the involvement of implicit processes in the similarity-attraction effect.

Intuitive processes are further implicated in the similarity-attraction effect by research on implicit egotism (Pelham, Carvallo, & Jones, 2005). Implicit egotism arises when people's intuitive positive associations about themselves spill over to evaluations of objects or persons that are connected with the self. In line with this idea, people have been found to gravitate towards similar others even when the basis of similarity to self is arbitrary, such as when people share birthdates (Finch & Cialdini, 1989) or name letters (Jones, Pelham, Carvallo, & Mirenberg, 2004). Because such tendencies are unlikely to emerge through conscious deliberation, the enhanced attractiveness of arbitrary forms of similarity presumably results from intuitive, implicit processes (see also Gawronski, Bodenhausen, & Becker, 2007). We know of no direct evidence for implicit egotism in conventional similarity-attraction effects. Nevertheless, implicit egotism research suggests at least the possibility that the similarity-attraction effect is (partly) caused by intuitive feelings of self-affection.

### **Anxiety and the Similarity-Attraction Effect: The Disruption-of-Intuition Hypothesis**

Given that the similarity-attraction effect may be grounded in intuitive processes (Clore & Byrne, 1974; Kubacka et al., 2010; Park & Schaller, 2005), it seems plausible that the effect could be influenced by people's emotions. In particular, we focus on the potential impact of anxiety on the similarity-attraction effect. Anxiety is a pervasive emotional-motivational state that is aimed at protecting oneself in threatening situations (Frijda, 1986; LeDoux, 1998). Classic and modern social-psychological studies have shown that anxiety-provoking conditions can increase interpersonal affiliation (e.g., Dutton & Aron, 1974; Mikulincer & Shaver, 2003; Taylor, 2006). However, this work has typically failed to consider whether anxiety has differential effects on affiliative tendencies towards others who are similar versus dissimilar to self.

In the present article, we propose that anxiety may reduce or eliminate the similarity-attraction effect, by disrupting people's introspective

access to their intuitive preference for similar over dissimilar others. This disruption-of-intuition hypothesis is based on converging lines of evidence. Experiments have shown that negative emotions can impair performance on tasks that require introspective access to intuitive processing, such as sensing whether word triads are coherent or not (Baumann & Kuhl, 2002; Bolte, Goschke, & Kuhl, 2003), intuitive preferences (Baumann, Kaschel, & Kuhl, 2005; Kuhl & Kazén, 1994; Quirin, Koole, Baumann, Kazén, & Kuhl, 2009), use of somatic markers in decision-making (De Vries, Holland, & Witteman, 2008), and use of experiential information in judgment (Ruder & Bless, 2003). As noted earlier, the similarity-attraction effect is at least partly driven by intuitive affective processes (Clore & Byrne, 1974; Kubacka et al., 2010; Park & Schaller, 2005). Consequently, negative emotion may attenuate the similarity-attraction effect by disrupting people's access to their intuitive affective responses to similarity and dissimilarity information.

For various reasons, anxiety may be more likely to disrupt the intuitive processes that underlie the similarity-attraction effect than other negative emotions. Anxiety tends to direct people's attention towards potentially threatening stimuli (e.g., Egloff & Hock, 2001; Eysenck & Byrne, 1992; Ouimet, Gawronski, Dozois, 2009; Wilson & MacLeod, 2003). This processing bias may overwhelm the influence of experiential information that is non-threatening, such as positive feelings towards a similar other. Second, anxiety has been found to promote a narrow perceptual scope, or "tunnel vision" (Derryberry & Reed, 1998; Easterbrook, 1959; Frederickson & Branigan, 2005). Several studies suggest that narrow perceptual processing makes it harder for people to access intuitive feelings (Halberstadt & Hooton, 2008; Koole, Dijksterhuis, & van Knippenberg, 2001; Topolinski & Strack, 2008; Wilson, Dunn, Kraft, & Lisle, 1989). Instead, access to intuition may be promoted by broadly distributed, holistic perceptual focus (Brown, Ryan, & Creswell, 2007; Koole, Govorun, Chang, & Gallucci, 2009).

A handful of earlier studies empirically examined the impact of anxiety on interpersonal attraction. A classic experiment by Dutton and Aron (1974) found that male participants became more attracted to a female confederate after crossing a shaky rather than a solid bridge. However, this study did not assess similarity to self, and thus could not de-

termine whether anxiety moderated the impact of similarity on attraction. Correlational studies have yielded a mixed bag of findings. Two studies found that individual differences in social anxiety (Heimberg, Acerra, & Holstein, 1985) and test anxiety (Reagor & Clore, 1970) were associated with a weaker or absent similarity-attraction effect. However, another study found the opposite effect, such that social anxiety was associated with a stronger similarity-attraction effect (Smith, 1970). From the present perspective, trait measures of anxiety may yield conflicting results because people's access to their intuitions may become disrupted by state rather than trait anxiety. Because trait anxiety is imperfectly correlated with state anxiety, trait studies are likely to yield variable findings. Taken together, the existing literature is inconclusive regarding the impact of anxiety on the similarity-attraction effect.

### **The Present Research and Hypotheses**

In the present research, we tested the notion that anxiety might eliminate the similarity-attraction effect (Byrne, 1971), leading to equally favorable evaluations of others who are similar versus dissimilar to the self. We tested this prediction using a modified version of Byrne's (1971) bogus stranger paradigm, in which participants evaluated others who were more or less similar to themselves in terms of their personality traits (Kubacka et al., 2010). Study 1 examined whether naturally occurring variations in state anxiety would moderate the similarity-attraction effect in the predicted manner. Study 2 tested the same prediction for experimentally manipulated anxiety.

We further sought to shed more light on the underlying processes whereby anxiety might reduce the similarity-attraction effect. One possibility is that anxiety disrupts the encoding of similarity information. To address this possible mechanism, we probed participants about the target persons' perceived similarity to self and examined participants' memory for similarity information in Study 1. Another possibility is that anxiety disrupts people's introspective access to their intuitive preferences. We tested this disruption-of-intuition hypothesis in two main ways. First, Study 2 measured the similarity-attraction effect both through self-report, and using an implicit measure of similarity-attraction (Fazio, 2001). According to the disruption-of-intuition hypothesis, anxiety disrupts people's access to their intuitive preferences, while leaving these intuitive

preferences themselves intact. Consequently, we predicted that anxiety would reduce the similarity-attraction effect in explicit, self-reported preferences, while leaving similarity-attraction effect intact in implicit measures of preference.

In Studies 3-5, we examined how participants' cognitive processing modes might interact with the effects of anxiety on similarity-attraction effect. Specifically, Study 3 examined if it is possible to eliminate the similarity-attraction effect among low-anxious individuals by asking them to explain their feelings of attraction. Such explanatory activity has been found to disrupt people's access to their intuitions in past research (Wilson, Dunn, Kraft, & Lisle, 1989), and may therefore block the intuitive process of self-compatibility checking even in the absence of anxiety. Studies 4 and 5 reversed this logic, by examining if manipulations that might enhance intuitive processing can lead to stronger similarity-attraction effect, particularly among high-anxious individuals. Study 4 tested this reasoning with a manipulation of mindfulness meditation (Overman, 1999), Study 5 with a manipulation of global and local processing style (cf. Navon, 1977).

### **Study 1**

We designed Study 1 with four goals in mind. Our first goal was to examine whether naturally occurring variations in state anxiety would moderate the similarity-attraction effect. To this end, participants in Study 1 completed a mood assessment before the bogus stranger task (Byrne, 1971). We predicted that state anxiety would moderate the similarity-attraction effect. More specifically, participants low in state anxiety were expected to rate others more favorably who were similar rather than dissimilar to themselves. By contrast, participants high in state anxiety were expected to rate others similar and dissimilar to themselves as equally favorable.

Our second goal in Study 1 was to examine if anxiety might prevent participants from detecting or remembering similarity information. To address this issue, Study 1 included questions about the target persons' perceived similarity to self. In addition, Study 1 tested participants' memory for similarity information, using a modified signal detection task. Previous research has found that people often misremember similar target persons as being more similar and dissimilar target persons as be-

ing more dissimilar to themselves (Kubacka, et al. 2010). Similarity information may thus give rise to memory biases in addition to evaluative bias. However, according to our disruption-of-intuition hypothesis, anxiety disrupts the similarity-attraction effect at an evaluative level, not by interfering with the detection or recall of similarity information. We therefore predicted that anxiety would not compromise participants' ability to detect which target person was more similar versus dissimilar to themselves, nor participants' memory for similarity information.

Our third goal in Study 1 was to determine whether our observed effects were specific to anxiety. To this end, our mood assessment in Study 1 included questions about participants' feelings of depression. We suspected that people's access to their intuitions is especially likely to become disrupted by anxiety, because anxiety may promote a narrow attentional set (Derryberry & Reed, 1998; Easterbrook, 1959; Frederickson & Branigan, 2005) that makes it harder access intuitive feelings (Koole et al., 2009; Topolinski & Strack, 2008; Wilson et al., 1989).

Finally, our fourth goal in Study 1 was to establish whether the similarity-attraction effect might be moderated by state versus trait anxiety. Study 1 therefore included measures of both manifestations of anxiety. Our theoretical model assumes that people's access to their intuition is disrupted by their momentary levels of anxiety, rather than by chronic sensitivity to anxiety. Consequently, we predicted that similarity-attraction effect would be moderated by state rather than trait anxiety.

### Method

#### Participants and Design.

Eighty-five Dutch university students (mean age = 19.23,  $SD = 0.98$ ) participated in exchange for course credit or monetary compensation. The experiment manipulated *similarity* of a target person to self (high versus low) between participants. The main dependent variables were participants' attraction to the target person and their recognition memory for information about the target person.

#### Procedure

Upon arrival at the laboratory, the experimenter randomly assigned participants to similar or dissimilar target conditions. Participants then continued with the experiment working in one of the individual cu-

bicles using a Macromedia Authorware 7.0 application. To strengthen the impression that other participants were present in the lab, the experimenter kept a number of cubicle doors in the laboratory closed at all times as though they were occupied.

Participants were first informed that the study would consist of a number of separate surveys combined. Participants then rated their current mood states, including their state anxiety, as well as their trait anxiety. The next part of the procedure was an adapted version of the bogus stranger paradigm (Byrne, 1971) developed by Kubacka et al. (2010). Participants were told that, via the computer network, they would be linked to another participant. To provide the information that would supposedly be sent to their future collaborator, participants rated whether or not they possessed a set of 12 moderately positive personality traits (e.g., calm, independent, spontaneous, ambitious). Participants were told that their future collaborator was providing the same information about their personality. Next, participants read a list of the traits that their future collaborator possessed, which was manipulated to be either more or less similar to them. To bolster the cover story, time delays were included in the experiment at points where the computer was supposedly sending information to the target persons.

Next, participants completed target person evaluation measures (attraction to the target person, perceived target person trustworthiness, and target person similarity). Following this, participants responded again to the set of 12 traits, this time indicating whether the target person trait was a similar or dissimilar to their own personality. Finally, participants were probed for suspicion. No participant guessed the true purpose of the experiment. At the end of the session, the experimenter explained that participants would not actually interact with the target person, provided debriefing information, thanked, and paid participants.

### **Independent Variables**

#### **Manipulation of target person similarity vs. dissimilarity.**

Target person similarity was manipulated through a procedure that was developed and validated by Kubacka et al. (2010). In this procedure, participants are presented with a list of 12 traits that were presumably held by their target person. In the similar condition, the target person's traits

were similar to the participant's traits for eight traits and dissimilar for four traits. In the dissimilar condition the target person's traits were dissimilar for eight traits and similar for four traits. All traits were moderately positive (e.g., proud, creative, proud, and intellectual).

**Negative mood.** Negative mood was measured using the anxiety and depression subscales of Profile of Mood States (POMS) questionnaire (Wald, 1984). Both subscales had six items. Participants rated the extent to which their current feelings were described by a series of adjectives (e.g., "panicky", "insecure" for anxiety scale; and "hopeless", "lonely" for depression scale; 0 = *not at all*, 8 = *very much*; Cronbach's  $\alpha$ s = .78 and .81, respectively).

**Trait Anxiety.** Trait anxiety was measured using Taylor's (1953) Manifest Anxiety Scale. Participants rated the extent to which the 50 items of the scale described them (e.g., "I often feel unreasonably worried about things which are not that important", "Life is often a burden for me"; 0 = *not at all*, 8 = *very much*;  $\alpha$  = .72).

### **Dependent Variables**

**Target person evaluation.** Participants rated their *attraction to the target person* on six items (e.g., "I think I could really like this person"; 0 = *not at all*, 8 = *very much*;  $\alpha$  = .78). In addition, participants rated the perceived similarity of the target person on a single item (0 = *not at all*, 8 = *very much*).

**Response bias.** Participants were presented with the list of twelve traits and rated for each trait whether the target person was similar or dissimilar to themselves on the respective trait. Drawing from signal detection analysis, we used the two-high threshold model (Snodgrass & Corwin, 1988) which states that  $p(\text{False Alarm}) / (1 - p(\text{Hit}) + p(\text{False Alarm}))$ . Response bias above .50 indicates a liberal bias, whereas values below .50 indicate a conservative bias. In the present study, liberal bias occurs in a situation where participants would rate a trait as similar irrespective of whether it actually was a similar or dissimilar to self. Conservative bias occurs in a situation where participants would rate a trait as dissimilar irrespective of whether it actually was similar or dissimilar to self. Hence, a liberal bias describes a situation where participants see similarities where they might not exist, while conservative bias describes

a situation where participants see dissimilarities where they might not exist.

## Results

**Similarity manipulation check.** To assess the effectiveness of the similarity manipulation, we regressed similarity condition onto perceived similarity. The model was significant  $p < .00$ ,  $R^2 = .28$ , and a positive effect of similarity indicated that the similar target person was perceived to be more similar to self than the dissimilar target person,  $\beta = .47$ ,  $p < .01$ ,  $t = 5.65$  ( $M_s = 5.75$  vs.  $3.35$ ,  $SD_s = 1.08$  and  $1.19$  for the similar and dissimilar other respectively). To test whether anxiety had any influence on our manipulation, we also added anxiety and the interaction between anxiety and similarity into the regression equation. We found no main or interaction effect involving,  $t_s < 1.00$ ;  $p_s = ns$ . Thus, the similarity manipulation created the intended perceptions of the target persons irrespective of participants' anxiety levels.

**The effects of state and trait anxiety and depression on similarity-attraction.** To test whether state anxiety influenced the similarity-attraction effect, we regressed the similarity condition, anxiety score, and the interaction between the two onto attraction. We found a main effect of similarity,  $t = 2.06$ ,  $p < .05$ ). In line with the similarity-attract effect (Byrne, 1971), similarity led to higher attraction ( $\beta = .27$ ). As expected, the effect of similarity was qualified by a significant interaction with anxiety,  $\beta = .11$ ,  $t = 2.19$ ,  $p < .04$ . We conducted a simple slopes analysis to determine the nature of this interaction effect. The effect of similarity on attraction was plotted for high- and low anxiety participants, taking one standard deviation above- and below the mean (Aiken & West, 1991). There was a significant effect of similarity on attraction among low-anxious participants,  $\beta = .18$ ,  $t = 2.92$ ,  $p < .00$ . By contrast, high-anxious participants displayed no reliable effect of similarity on attraction,  $t_s < 1.00$ . Figure 1 illustrates the results. Parallel analyses with depression ratings yielded no significant effects involving depression,  $t < 1.00$ . Moreover, parallel analyses with trait anxiety also did not show any significant interaction involving trait anxiety,  $t < 1.20$ .

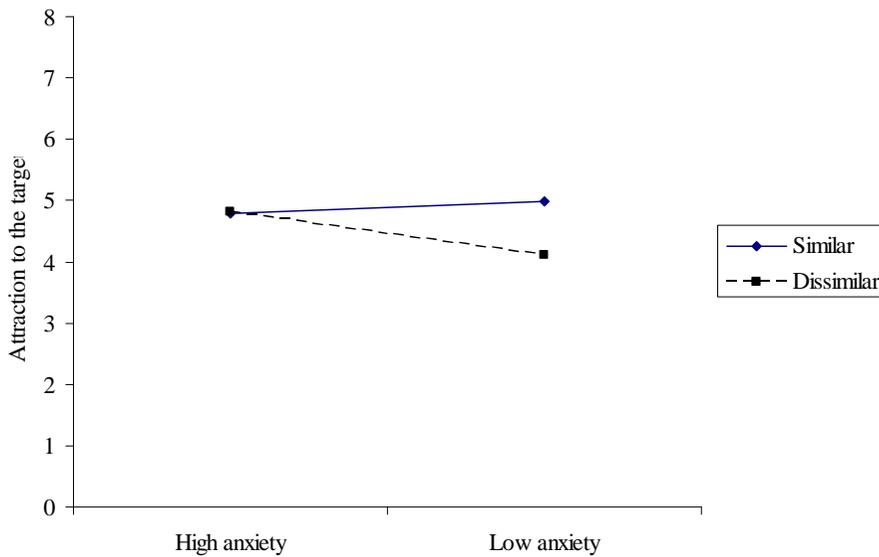


Figure 1. Mean attraction for similar and dissimilar other as a function of measured anxiety, Study 1.

**The effect of anxiety on response bias.** To test the influence of anxiety on participants' recall of similarities and dissimilarities, we regressed similarity condition, anxiety scores, and their interaction onto participants' response bias score. We found that similarity condition had a significant effect on response bias,  $t = 2.04$ ,  $p < .05$ , in that participants in the similarity condition exhibited a more liberal bias than those in the dissimilarity condition,  $\beta = .10$ . There were no significant effects of either anxiety or the interaction between similarity and anxiety,  $ts < 1.00$ ,  $ps = ns$ . Thus, both anxious and non-anxious participants showed a tendency to see traits of similar target persons as similarities, even when they were actually dissimilarities, and vice versa for traits of dissimilar target persons. Parallel analyses yielded no significant effects involving depression.

### Discussion

Study 1 found initial evidence that state anxiety moderated the similarity-attraction effect. Namely, participants with higher levels of state anxiety exhibited equal attraction to similar and dissimilar others,

while participants with lower levels of state anxiety exhibited a preference for similar others, in line with the classic similarity-attraction phenomenon (Byrne, 1976). Participants' recall of similarities and dissimilarities, and their perception of target persons as being similar and dissimilar were not related to anxiety. The latter finding is in line with the self-compatibility checking model, in that anxiety interfered with the similarity-attraction phenomenon solely on an evaluative level. Finally, neither depression nor trait anxiety affected participants' preference for similar others. Thus, only momentary feelings of anxiety appeared to have disrupted the similarity-attraction effect.

### Study 2

Although the findings of Study 1 were encouraging, the correlational design of the study precluded any causal inferences about the effects of anxiety. We therefore designed Study 2 to test whether we could replicate the findings of Study 1 using an experimental manipulation of anxiety. To manipulate anxiety, we used a public speaking task, which is widely used to induce anxiety (Dickerson & Kemeny, 2004; Gramer & Sprintschnick, 2008; Starcke, Wolf, Markowitsch, & Brand, 2008). We hypothesized that the effects manipulated anxiety would mirror the effects found for measured state anxiety in Study 1. Thus, we predicted that manipulated anxiety would eliminate the similarity-attraction effect.

Study 2 further included an implicit measure of participants' evaluations of the target person. Our implicit measure was based on an evaluative priming task, a well-established procedure to assess implicit attitudes (Fazio, 2001). Our disruption-of-intuition hypothesis holds that anxiety disrupts people's cognitive access to their intuitive preferences, while leaving these intuitive preferences themselves unaffected. Consequently, we predicted that anxiety would moderate the similarity-attraction effect in participants' explicit evaluations, but not in their implicit evaluations.

### Method

#### Participants and Design

Fifty-three Dutch students (22 male; mean age = 22.30,  $SD = 3.95$ ) participated in exchange for course credit or a monetary compensa-

tion. Anxiety was manipulated between participants to be high or low. Target person's similarity was manipulated within participants.

### **Procedure**

The study was conducted in a room with a one-way mirror, and participants completed the study on a laptop using Macromedia Authorware 7.0 software, and in individual sessions. Upon arriving in the laboratory, participants were randomly assigned to either the anxiety or control condition. In the anxiety condition, the experimenter led participants to the room, placed a video camera in it, and informed them that the study would include a part in which they would be filmed. Participants in the control group performed the study in the same room without a camera.

All participants were aware that the mirror in the room was in fact a one-way mirror and the experimenter would be in a side room observing them through the mirror throughout the experiment, if ever they needed any assistance. Next, participants proceeded with the instructions administered by a computer program. Participants first answered a series of demographic questions and a mood measure. Upon completion of these questions, participants were asked to call the experimenter and the anxiety manipulation took place (as described below). Participants in the control condition were asked to read an essay, on the topic of cell phones, and answer questions on whether it was interesting, well-written, and well-researched. The task was designed to be neutral and to keep the length of experiment the same for participants in the control and the anxiety condition. Next, participants were told that they would interact with two other participants who were in different labs.

Participants then rated themselves on the first set of 12 traits, and received information about a dissimilar target person. Unlike in Study 1, participants were asked to give themselves two-letter nicknames and were told them that their future collaborators (the dissimilar and similar target persons) would do the same. The nicknames were used later in the experiment, in the implicit other-evaluation task. The nicknames for dissimilar and similar target persons were respectively: ZT and DS. Also, in another change to Study 1, participants responded to two target persons: first a dissimilar one, then a similar one. The manipulation of

(dis)similarity followed the procedure of Study 1. Also, participants responded to the same set of dependent measures as in Study 1. Before rating themselves on the second set of 12 traits, participants in the anxiety condition were given time to go through their notes for the public speaking task; participants in control condition simply proceeded with the ratings. Next, participants received information about the similar target person, and responded to the dependent measures as well as the mood measure.

Following the completion of the explicit measures, participants completed a word evaluation study that contained an implicit assessment of evaluations of the other participants. To ensure that participants correctly remembered the target persons and their nicknames, they saw the information about both target persons again. After completing the word evaluation study, participants in the anxiety condition delivered a speech in front of a camera (which was in fact not recording their speech). They then received a message via the computer informing them that for time reasons they would not have to interact with the other two participants. Participants in the control group received this message immediately after responding to the mood measurement. Next, participants were probed for what they thought was the purpose of the research. After that participants were thanked, debriefed and paid for their participation.

### **Independent Variables**

**Anxiety Manipulation.** The public speaking task was presented as an initiative of the university, which was concerned with its students' job opportunities and their readiness for the difficult economic situation at the time. Therefore participants were instructed to prepare a 3-minute speech to answer a question typically asked in job interviews: "What are your strengths and weaknesses?". Next, participants were told that the speech would be recorded and evaluated by Human Resources experts hired by the university.

### **Dependent Measures**

Study 2 included the same explicit measures of attraction as Study 1.

**Implicit other-evaluation measure.** The implicit other-evaluation measure was adapted from an evaluative priming task, a well-

established paradigm for assessing implicit evaluations (Fazio, 2001). The task was presented as an investigation of the way people evaluate words. During each trial, a row of Xs would appear in the centre of the computer screen. After this, a letter-pair was flashed on the computer screen for 17 ms. In one half of the trials, the letter-pair was the dissimilar target person's nickname ("ZT"). In the remaining trials, the letter-pair was the similar target person's nickname ("DS"). The nickname was then overwritten by a second row of Xs that remained on screen for 1000 ms. The rows of Xs served as a backward mask and fixation point. Next, the computer screen went blank for 100 ms before the appearance of the target word.

When the target word appeared, participants were to indicate the valence of the sentence as quickly and accurately as possible. Participants were to press the "a" button (indicated by a sticker placed to the extreme left of the keyboard) when the target word was negative or the "6" button (indicated by a sticker placed on the number pad to the extreme right of the keyboard) when the target word was positive. The target word disappeared from the screen after participants responded. At that point, the computer screen went blank for one second before the onset of the next trial. The task began with 4 warm-up trials, followed by 24 experimental trials. The trials were presented in a different random order for each participant.

The target words for the task were pre-tested by Koole and Fockenberg (in press). The negative targets were: haat (hate), schuldig (guilty), schaamte (shame), ruzie (quarrel), slaan (to hit), and verlaten (abandoned). The positive targets were: trots (proud), vrede (peace), samen (together), vertrouwen (trust), geven (to give), and gezellig (cozy). All the targets appeared twice, once with a subliminal dissimilar target person's nickname, and once with subliminal similar target person's nickname.

## Results

**Similarity manipulation check.** To assess the effectiveness of the similarity manipulation, we regressed similarity condition onto perceived similarity. The model was significant ( $p < .00$ ,  $R^2 = .29$ ), with a significant positive effect of similarity on perceived similarity ( $\beta = .49$ ,  $p < .01$ ,  $t [54] = 5.88$ ). Again, we found no main effect of anxiety and no

interaction between anxiety and similarity ( $ts < 1.00$ ;  $ps = ns$ ). Thus, our manipulation created the intended similar and dissimilar target person profiles for anxious and non-anxious participants.

**Anxiety manipulation check.** Recall that participants' moods were assessed three times: at the beginning of the experiment (Time 1), after the manipulation (Time 2), and after the presentation of the similar profile (Time 3). To assess the effectiveness of the anxiety manipulation, we performed a 3 (anxiety measurements at Time 1, 2, and 3) x 2 (anxiety vs. control condition) repeated measures analysis of variance with the three measurements of anxiety as within-person factors. We found the predicted interaction between time and anxiety condition,  $F(1, 54) = 28.60, p < .001, \eta^2 = .35$ . We explored the interaction and found no effect of time in the control condition,  $F < 1$ . By contrast, in the anxiety manipulation condition, the predicted increase of anxiety over time emerged,  $F(1, 53) = 25.22, p < .001, \eta^2 = .33, M = 1.64, SD = 0.34; M = 2.34, SD = 1.31; \text{ and } M = 2.29, SD = 1.23$  for the anxiety measurement at Times 1, 2, and 3, respectively. After the manipulation, the anxiety level in the experimental condition was higher than in the control condition,  $F(1, 53) = 2.69, p < .01, \eta^2 = .26, M = 2.34, SD = 1.31$  versus  $M = 1.63, SD = .32$  for experimental and control condition respectively. Also at Time 3, participants in the experimental condition still reported higher levels of anxiety than in the control condition  $F(1, 53) = 3.95, p < .001, \eta^2 = .23; (Ms = 2.29, SD = 1.23 \text{ versus } 1.81, SD = .35$  for experimental and control condition respectively). Thus, our manipulation created the intended difference in anxiety levels among participants.

**Effects of anxiety and similarity on self-reported attraction.** To see whether manipulated anxiety moderated the similarity-attraction effect, we performed a 2 (anxiety versus control condition) x 2 (similar versus dissimilar target) repeated measures ANOVA, with the latter as within-subject factor. As predicted, we found a main effect of similarity, in that similar partners were overall liked better than dissimilar ones,  $F(1, 51) = 14.30, p < .001, \eta^2 = .22, Ms = 4.63, SD = 0.75$  versus  $4.20, SD = .67$  for similar and dissimilar partners respectively. More importantly, the main effect of similarity was qualified by an interaction with anxiety,  $F(1, 51) = 6.25, p < .05, \eta^2 = .11$ . This interaction represented visually

in Figure 2. Follow-up tests showed that participants in the anxiety condition did not show a similarity effect,  $F(2, 50) < 1$ ,  $M_s = 4.51$  versus 4.43,  $SD = 0.80$  versus 0.67, for similar and dissimilar partners. However, participants in the control condition displayed the similarity-attraction effect,  $F(2, 50) = 12.01$ ,  $p < .01$ ,  $\eta^2 = .19$ ,  $M_s = 4.70$  versus 3.97,  $SD = 0.89$  versus 0.49, for similar and dissimilar partners, respectively.

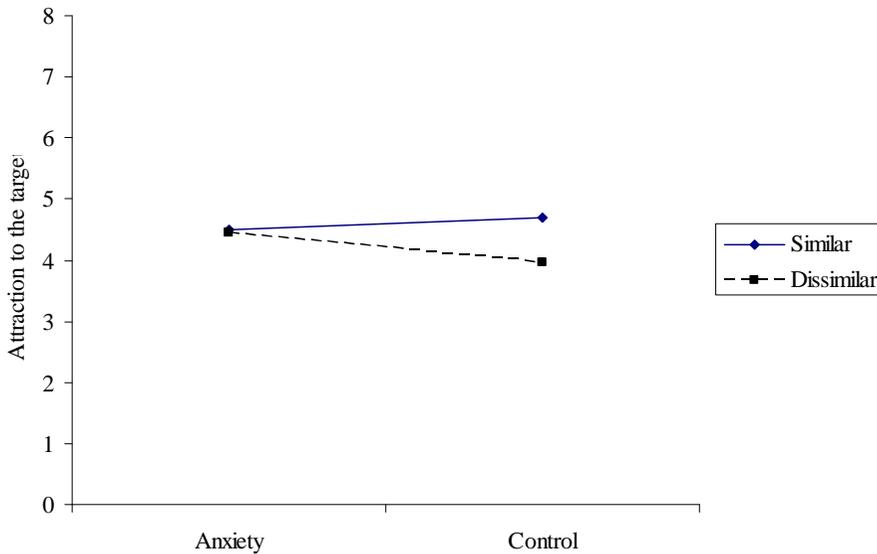


Figure 2. Mean attraction for similar and dissimilar other as a function of manipulated anxiety, Study 2.

**The effect of anxiety on implicit other-evaluations.** To investigate whether anxiety affected the implicit evaluations of the target persons, we first screened the data for correct responses and outliers. Specifically, we removed wrong responses (2.2% of all responses) from the dataset. Next, we replaced responses above 1500 ms by 1500 ms (2.8% of all responses) and responses below 300 ms by 300 ms (0.08% of all responses).

We then submitted participants' average response latencies to a 2 (target person similarity) x (anxiety versus control condition) x 2 (target valence) ANOVA. The analysis revealed a significant main effect for target valence, which meant that positive targets were evaluated faster than negative targets  $F(1, 51) = 3.97$ ,  $p < .05$ ,  $\eta^2 = .09$  ( $M = 711$  ms vs.

$M = 757$  ms). This trend was qualified by a significant interaction between similarity and target valence  $F(1, 50) = 4.08, p < .05, \eta^2 = .10$ . Simple effects test revealed that participants responded faster to positive targets after being primed with the nickname of the similar target person than with the nickname of the dissimilar target person,  $F(1, 50) = 10.35, p < .01, \eta^2 = .21$  ( $M = 701$  ms vs.  $M = 779$  ms for similar and dissimilar targets respectively). In addition, participants responded faster to negative targets after being primed with the nickname of the dissimilar target person than the nickname of the similar target person  $F(1, 50) = 3.96, p < .05, \eta^2 = .09$  ( $M = 741$  ms vs.  $M = 767$  ms for dissimilar and similar targets respectively). No effects of anxiety condition emerged ( $F_s < 1$ ).

### Discussion

Using an experimental manipulation of anxiety, Study 2 conceptually replicated the effects of Study 1. Participants in the low anxiety condition preferred similar over dissimilar others, whereas participants in the anxiety condition did not differ in their attraction to similar and dissimilar others. Thus, anxiety eliminated the similarity-attraction effect in explicit evaluations. However, anxiety did not eliminate the similarity-attraction effect in the evaluative decision task (Fazio, 2001), which measures implicit evaluations. On the implicit evaluation test the responses of both anxious and non-anxious participants for the similar target persons were more strongly associated with positive words than those for dissimilar target persons. This pattern of results fits with the idea that anxious individuals maintain an intuitive preference for similar over dissimilar others, even though their self-reported preference for similar over dissimilar others has been eliminated.

### Study 3

In Study 3, we compared the effects of anxiety to a manipulation that is known to impair people's access to intuitive evaluations. Past research has shown that asking people to explain why they like or dislike something can lead people to lose sight of the intuitive basis of their attitudes (Halberstadt, 2006; Wilson, Dunn, Kraft, & Lisle, 1989). The explanation for this paradoxical effect of explanatory introspection is that people's explanations tend to focus on a small set of accessible and easily verbalizable reasons, and thus tend to omit many of the more diffuse, intuitive grounds for holding a particular attitude (Wilson et al., 1989).

Explanatory introspection may thus disrupt people's access to their intuitive preferences in a manner that is analogous to anxiety.

Study 3 examined the joint impact of naturally occurring variations in experienced anxiety and experimentally manipulated explanatory introspection. In view of our theoretical model and the findings in Studies 1-2, we predicted that high-anxious participants would display a significantly weaker similarity-attraction effect than low-anxious participants. Prior work (Wilson et al., 1989) led us to believe that explanatory introspection would similarly weaken the similarity-attraction effect. However, given that high-anxious participants already failed to show a similarity-attraction effect in Studies 1 and 2, it seemed unlikely that explanatory introspection would further reduce the similarity-attraction effect among high-anxious participants. We therefore predicted that anxiety and explanatory introspection would interact, such that explanatory introspection would make low-anxious similar to high-anxious participants, by reducing or eliminating the similarity-attraction effect.

Study 3 also included a measure of attachment anxiety (Fraley, Waller, & Brennan, 2000), as another individual difference that potentially moderates the similarity-attraction effect (see Shaver & Mikulincer, 2003). We predicted that the disruptive effects of state anxiety would emerge over and above any effects of attachment anxiety. In addition, we measured participants' feelings of fatigue, anger, and vigor. In line with our model, we predicted no effects of fatigue and vigor, because neither relates to levels of threat to the self. Finally, although anger may arise in self-threatening contexts (Bushman & Baumeister, 1998), anger is approach-oriented (Harmon-Jones & Allen, 1998). We regard the disruption of intuition by anxiety as an avoidance-oriented, self-protective mechanism because it is likely to orient people towards external (and potentially threatening stimuli). Hence, we did not predict that approached-oriented emotions such as anger would reduce the similarity-attraction effect.

### Method

#### Participants

Sixty-five Dutch students (mean age = 19.30,  $SD = .72$ ) participated in exchange for course credit or monetary compensation. Explanatory introspection (present versus absent) was manipulated between par-

ticipants. As in Study 2, target person's similarity was manipulated within participants.

### Procedure

Upon arrival, participants were randomly assigned to a reasoning or control condition. Next, participants completed some demographic measures, and the Profile of Mood States mood questionnaire, and proceeded with a similar bogus stranger task as in Study 2. However, before providing their evaluations of each target person, participants in the reasoning condition were asked to write down reasons why they would like or dislike that target person. Participants in the control condition did not receive this instruction. At the end of the study, participants were probed for their suspicion about the actual purpose of the study, and then told that due to time reasons they would not work with their target person. Finally, all participants were thanked, paid and debriefed.

### Measures

Study 3 included the same explicit measures as Studies 1-2 with the exception of the mood measure for which we used the complete, 31-item Profile of Mood States (POMS) questionnaire (Wald, 1984). In Study 3, apart from anxiety, we measured participants' depression, fatigue, anger, and vigour. All subscales consisted of six items (e.g., "angry", I "agitated" for anger scale; and "low on energy", "tired" for fatigue scale; 0 = *not at all*, 8 = *very much*; Cronbach's  $\alpha$ s = .78 and .81, respectively). In addition, participants completed a measure of attachment orientation, an 18-item version of the Fraley, Waller, and Brennan (2000) ECR instrument (e.g., for anxiety, "People are never there when you need them"; for avoidance, "I find it is easy to get close to others";  $\alpha$ s = .78, .82).

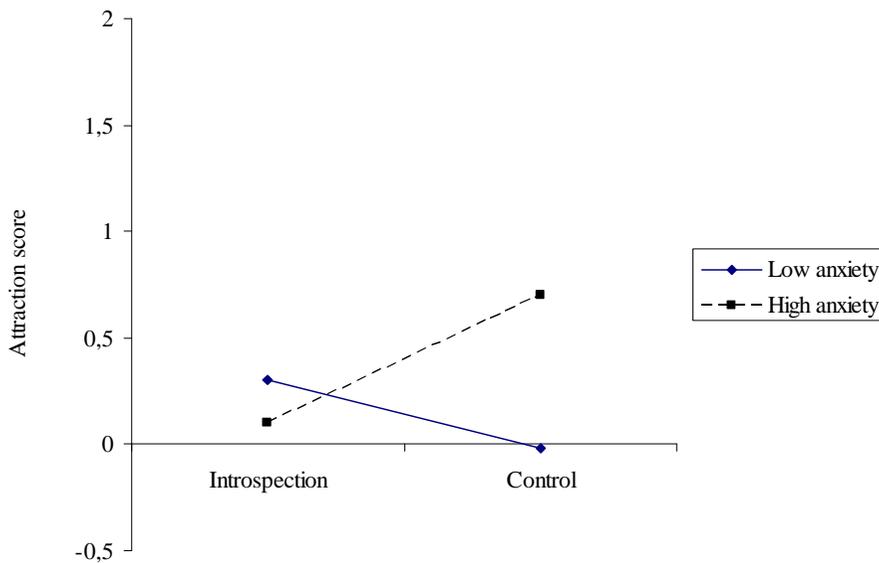
### Results

**Similarity manipulation check.** To assess the effectiveness of the similarity manipulation, we performed a repeated measures ANOVA. As predicted, we found that similarity had a main effect on perceived similarity,  $F(1, 63) = 21.84, p < .001, \eta^2 = .41$ , signifying that similar targets were perceived as more similar to self than dissimilar targets,  $M_s = 4.75$  vs.  $2.35, SD_s = 1.48$  and  $1.39$ . There were no effects involving anxiety or explanatory introspection on this index,  $F_s < 1$ .

**Effects of anxiety and explanatory introspection on the similarity-attraction effect.** We performed a repeated measures ANOVA with target similarity as a within-subject factor, and anxiety scores and explanatory introspection as between-subject variables. As predicted, we found a main effect of target similarity,  $F(1, 62) = 9.84, p < .001, \eta^2 = .24$ , with similar others being liked more than dissimilar others ( $M = 4.88, SD = .99$  vs.  $M = 4.11, SD = .77$  for similar and dissimilar targets).

Importantly, we also found the predicted moderation of the effects of similarity by anxiety,  $F(1, 63) = 4.01, p < .05, \eta^2 = .14$ . This moderation was qualified by the predicted three-way interaction between anxiety, target similarity, and explanatory introspection,  $F(1, 64) = 3.94, p < .05, \eta^2 = .11$ . Follow-up tests indicated that, in the explanatory introspection condition, there was no interaction between anxiety and target similarity and attraction, and both low- and high-anxious participants failed to show the similarity attraction effect,  $F_s < 1$ . By contrast, in the control condition, we found that anxiety moderated similarity-attraction as it did in Studies 1-2,  $F(1, 63) = 8.04, p < .01, \eta^2 = .21$ . Low-anxious participants exhibited the similarity-attraction effect,  $F(1, 62) = 10.84, p < .001, \eta^2 = .26, M_s = 4.92$ , versus  $4.09, SD_s = 0.78$  versus  $0.81$  for similar and dissimilar targets, whereas high-anxious participants did not show the similarity-attraction effect  $F < 1, p > .10, M_s = 4.62$ , versus  $4.79, SD_s = 0.78$  versus  $0.81$ , for similar and dissimilar targets respectively. Figure 3 displays the relevant means.

**The role of attachment anxiety and other mood states.** To explore the effects of attachment anxiety and avoidance, we repeated the aforementioned analyses with attachment anxiety and avoidance subscales separately. The results showed no main effects or significant interactions involving attachment anxiety or avoidance,  $F < 1$ , and  $F(1, 63) = 1.31$ , for anxiety and avoidance respectively, all  $p_s > .10$ . Likewise, we repeated the analysis with anger, vigor, fatigue and depression in separate analyses, and found no significant main effects or interactions involving these mood states  $F_s < 1$ .



*Figure 3.* Mean attraction for similar and dissimilar other as a function of explanatory introspection manipulation, Study 3.

### Discussion

The results of Study 3 confirmed that individuals with high anxiety do not display a similarity-attraction effect. In addition, explanatory introspection led non-anxious participants to show the same lack of preference for similar over dissimilar others as anxious participants. These results suggest that the effects of anxiety parallel the effects of explanatory introspection, a manipulation that is known to alienate people from their intuitive preferences (Halberstadt, 2006; Wilson et al., 1989). Explanatory introspection did not affect the preferences of anxious individuals, who failed to show the similarity-attraction effect regardless of whether they had engaged in explanatory introspection. Thus, anxiety seems to disrupt the process of similarity-attraction to such an extent that an additional disruption does not affect it anymore. Moreover, Study 3 found that other negative emotions such as anger, vigor, or fatigue did not moderate the similarity-attraction effect, and neither did attachment anxiety. Consequently, the disruption of similarity-attraction effects by negative emotion seems specific to anxiety.

**Study 4**

Anxiety and explanatory introspection both induce narrowing of cognitive processing style (Halberstadt, 2006; Luu, Tucker & Derryberry, 1998; Tucker & Derryberry, 1992; Wilson et al., 1989). As such, the question arises whether a manipulation that broadens people's cognitive focus might help high-anxious individuals to recover their intuitive preference for similar over dissimilar others. To examine this possibility, Study 4 examined the joint influence of manipulated anxiety and the breadth of cognitive focus on the similarity-attraction effect.

To manipulate breadth of cognitive focus, we used the Navon task (Navon, 1977). In this task, participants receive a set of large letters which are made up from small letters, and participants' task is to decide whether either the large letter (in the global condition) or a small letter (in the local condition) appears on the screen. Prior research has found that attending to the large letters serves to broaden people's perceptual and conceptual focus relative to attending to the small letters (Förster & Higgins, 2005). Notably, recent research has also shown that global focus increases individuals' focus on similarity, while local focus increases individuals' focus on dissimilarity (Förster, 2009). Given the design of Study 4, we were able to investigate the possibility that the induction of global or local focus would quantitatively change individuals' perception of similarity by including the similarity manipulation check as in previous studies.

We predicted that a global focus would strengthen the similarity-attraction effect. It was unclear whether we should predict an interaction between perceptual focus and anxiety. Given that anxiety tends to narrow perceptual focus (Tucker & Reed, 1998), inducing a global focus might be more impactful among high-anxious individuals than among low-anxious individuals. However, there is likely to be considerable variation among low-anxious individuals in the degree to which they display a more global versus local processing style. Inducing a more global processing style might therefore increase the similarity-attraction effect among both high- and low-anxious individuals. Our examination of the interaction between perceptual focus and anxiety was hence of a more exploratory nature.

## Method

### Participants and Design

Ninety-six Dutch students (24 male; mean age = 20.01,  $SD = .91$ ) participated in exchange for course credit or monetary compensation. The experimental design was 2 (anxiety: high or low)  $\times$  2 (focus: global or local)  $\times$  2 (target person: similar or. dissimilar). Target person similarity was manipulated within-participants; anxiety and attentional focus were manipulated between participants.

### Procedure

Upon arriving in the laboratory, participants were randomly assigned to either the anxiety or a control condition; and a global or local processing condition. Participants in the anxiety condition were shown a room with a video camera and were told about the public speaking task, as in Study 2. Next, participants answered demographic questions and a mood questionnaire via a computer. The global versus local processing was introduced using the Navon letter task (as described below). The anxiety manipulation and bogus stranger task followed the same procedure as in Study 2. At the end, all participants were thanked for their participation, debriefed and paid.

### Variables

**Global/local focus manipulation.** We manipulated global and local focus using a Navon letter task. In that task participants reacted to a set of large letters, which were composed of small letters. Participants in the global condition had to indicate whether the large letter appeared on the screen (by pressing a key marked with a '1' or a '2'). Participants in the local condition had to indicate whether the small letter appeared on the screen (by pressing a key marked with a '1' or a '2'). The task was introduced as measuring reflexive behaviour, and participants were told to make their decisions as fast as possible. The task consisted of a trial of four letters, and the manipulation of 20 letters.

### Results

**Similarity manipulation check.** A repeated measures ANOVA found that similarity had a main effect on the ratings of perceived similarity,  $F(1, 93) = 28.84, p < .001, \eta^2 = .46$ , with higher ratings for similar than dissimilar partners,  $M_s = 4.95$  versus 2.65,  $SD_s = 1.08$  versus

0.92 for the similar and dissimilar target person respectively. Again, we found no main effect of anxiety and no interaction between anxiety and similarity,  $F(1, 93) < 1.1$ . We found no difference between participants in the global versus local focus condition and in the control condition,  $F_s < 1$ .

**Anxiety manipulation check.** A repeated measures ANOVA with anxiety condition as an independent variable and the three reports of anxiety as a within-subject dependent variable yielded a significant time effect,  $F(1, 93) = 14.59, p < .001, \eta^2 = .31$ , which was qualified by the predicted interaction between time and anxiety condition,  $F(1, 93) = 28.60, p < .001, \eta^2 = .35$ . Follow-up tests showed that, in the control condition, there was no effect of time,  $F < 1, p > .10$  ( $M_s = 3.10, 3.02, 2.96, SD_s = .69, .72, .77$ ). By contrast, there was a significant increase of anxiety over time in the anxiety manipulation condition,  $F(1, 53) = 9.11, p < .01, \eta^2 = .24$  ( $M_s = 3.02, 4.66, 4.44; SD_s = .72, .89, .82$ ). Thus, our manipulation created the intended difference in anxiety levels among participants. In addition, we checked whether our manipulation influenced any other emotion and found that neither, anger, fatigue, depression, nor vigor were affected by the public speaking task. The analyses revealed no significant differences between the control and the anxiety condition on any of these emotions, all  $F_s < 1$ .

**The effect of anxiety and global and local focus on similarity-attraction.** To see how anxiety and perceptual focus affected the similarity-attraction effect, we performed a 2 (anxiety versus control condition) x 2 (global versus local focus) x 2 (similar versus dissimilar target) repeated measures ANOVA, with similar versus dissimilar target as a within-subject factor on the attraction measure. As predicted, we found a main effect of similarity, signifying that similar partners were overall liked better than dissimilar ones,  $F(1, 93) = 5.35, p < .05, \eta^2 = .11, M_s = 4.23, SD = 0.75$  versus  $4.00, SD = .67$  for similar and dissimilar partners respectively. This main effect was qualified by an interaction with manipulated anxiety,  $F(1, 93) = 5.95, p < .05, \eta^2 = .09$ .

Follow-up tests showed that participants in the anxiety condition did not show a similarity effect,  $F = 1.19, p > .10, M_s = 4.69$ , versus  $4.74, SD_s = 0.76$ , versus  $0.73$ , for similar and dissimilar targets respectively.

Participants in the control condition displayed the similarity-attraction effect,  $F(1, 94) = 11.01, p < .001, \eta^2 = .27, M_s = 4.50$  versus  $4.00, SD = 0.90$  versus  $0.60$ , for similar and dissimilar targets, respectively. In addition, we found an interaction between the similarity condition and the global-local focus  $F(1, 93) = 6.41, p < .05., \eta^2 = .13$ . Inspection of the data revealed that the local condition there was only a marginally significant effect of similarity on attraction,  $F(1, 94) = 3.02, p < .09, \eta^2 = .02, M_s = 4.31$  vs.  $4.06; SDs = .77$  versus  $.69$ . By contrast, in the global condition, there was a much more pronounced similarity-attraction effect  $F(1, 94) = 6.41, p < .05, \eta^2 = .10, M_s = 4.42$  vs.  $3.93; SDs = .80$  versus  $.71$  for similar and dissimilar others, respectively. There was no significant interaction between anxiety and global-local focus,  $F(1, 94) = 1.06, p > .10$ . Figure 4 visually displays the observed effects.

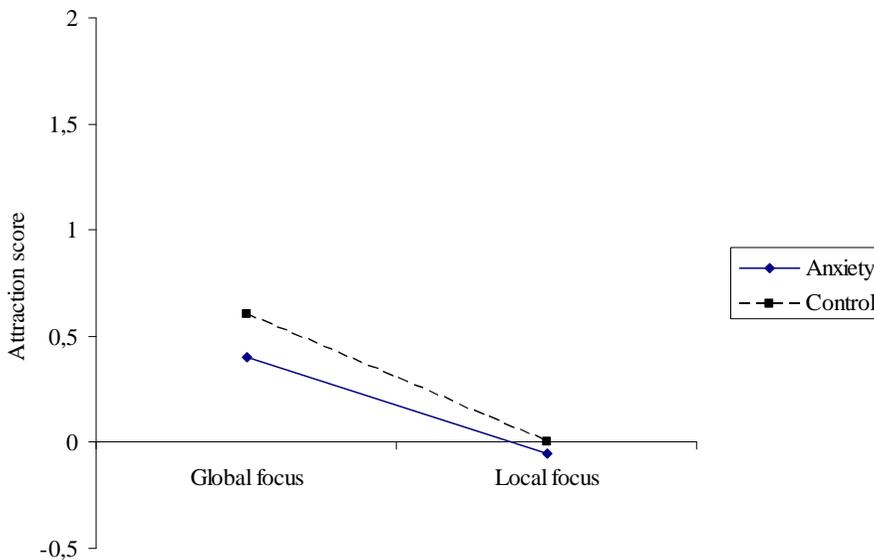


Figure 4. Mean attraction for similar and dissimilar other as a function global and local focus manipulation, Study 4.

### Discussion

As predicted, Study 4 found that the similarity-attraction effect was reduced by anxiety and enhanced by a global perceptual focus. The effects of anxiety and processing style did not interact, however. One

interpretation of this lack of a statistical interaction effect may be that high-anxious participants were still kept by their underlying anxiety from fully embracing their intuitive preference for similar over dissimilar others. According to this interpretation, high-anxious participants were less responsive to the global processing manipulation than low-anxious participants. Another interpretation is that the local processing condition led low-anxious participants to display somewhat less similarity-attraction effects, and thus that they showed effects of global processing in the same direction as high-anxious individuals. More research is needed to untangle these possibilities.

Contrary to previous findings (Förster, 2009), the manipulation of perceptual focus did not result in an increased perception of similarity or dissimilarity. However, it is important to note that previous research used paradigms in which similarity was judged for objects (e.g., comparing art work and methane gas) and that the search for similarity or dissimilarity did not involve comparisons with the self. It is thus possible that perceptual focus may be more influential on the evaluative level -as it was in the present study- in the area of social cognition. Again, future research is needed to understand when perceptual focus changes perceptions of similarity and when it changes the evaluative meaning of similarity.

### Study 5

Study 5 investigated an intervention that could potentially strengthen rather than weaken the similarity-attraction effect. Recent research indicates that mindfulness meditation can promote a more intuitive style of information processing (Brown, et al., 2007; Cahn & Polich, 2006). For instance, a recent set of studies found that mindfulness meditation promotes congruence between explicit and implicit self-esteem, presumably by bringing people in touch with their intuitions about themselves (Jordan, Whitfield, & Zeigler-Holl, 2007). In view of these findings, mindfulness meditation might help people in engage in more intuitive evaluation-making about potential relationship target persons. If so, then mindfulness meditation might strengthen the similarity-attraction effect.

To test these notions, Study 5 examined the joint influence of mindfulness and naturally occurring variations in anxiety on the similar-

ty-attraction effect. We predicted that anxiety would be associated with a weaker similarity-attraction effect and that mindfulness meditation would lead to a stronger similarity-attraction effect. However, we were not quite certain whether to predict an interaction between mindfulness meditation and anxiety. Given that some forms of mindfulness meditation have been found to reduce anxiety (Brown et al., 2007; though see Koole et al., 2009), mindfulness meditation might be more impactful among high-anxious individuals than among low-anxious individuals. However, mindfulness cannot be equated with low anxiety. As such, mindfulness meditation might increase the similarity-attraction effect among low- and high-anxious individuals alike. Thus, our examination of the interaction between mindfulness meditation and anxiety was of a more exploratory nature.

### **Method**

#### **Participants and Design**

Fifty-six Dutch students (19 male; mean age = 21.20,  $SD = 2.88$ ) participated in an exchange for course credit or monetary compensation. Variations in state anxiety were measured during the study, as in Studies 1 and 3. The study had a 2 (mindfulness high versus low) x 2 (Target person's similarity vs. dissimilarity) between participants design.

#### **Procedure**

Upon arriving in the laboratory the experimenter randomly assigned participants to either mindfulness or control condition. As in the previous studies, participants proceeded with completing demographic and dispositional measures. Subsequently, participants in the mindfulness condition received an instruction for the meditation exercise, a recording which they listened to via headphones. In the control condition, participants received an instruction to count all the verbs in the recording. Hence, all participants received the same meditation exercise recording via the headphones, but only those in the mindfulness condition were to listen to its meaning. After the end of the recording participants in the control group indicated the number of verbs they counted. Following this manipulation, the dissimilar and the similar target person were presented, using the same procedure as in Studies 2-3. Mood was assessed two more times - before the dependent variables for the dissimilar and then similar

target person were presented. After receiving information about the dissimilar and similar target persons and replying to the dependent measures for each of them, we asked all participants for what they thought was the purpose of the research. Finally all participants were thanked, debriefed, and paid for their participation.

### **Independent Variables**

Anxiety was measured, as in Studies 1 and 3.

**Mindfulness meditation.** During the mindfulness meditation exercise, participants listened to an 11-min long guided body scan exercise developed and recorded by Overman (1999; see also Koole et al., 2009). The exercise was narrated by a male voice and was accompanied by relaxing music. Within the exercise, participants were instructed to sit in a relaxed and wakeful posture with their eyes closed and to focus on their breathing. Participants were then directed to observe sensations in each area of their body in a careful and non-judgmental fashion. The exercise was narrated by a male voice and was accompanied by relaxing music. We chose the body scan exercise because the clarity of instructions makes it an appropriate technique for people who are not familiar with the practice of meditation.

### **Results**

**Similarity manipulation check.** To assess the effectiveness of the similarity manipulation, we regressed similarity condition onto perceived similarity. The model was significant ( $p < .00$ ,  $R^2 = .29$ ), with a significant positive effect of similarity on perceived similarity ( $\beta = .49$ ,  $p < .01$ ,  $t[55] = 5.88$ ). Again, we found no main effect of anxiety and no interaction between anxiety and similarity ( $ts < 1.00$ ;  $ps = ns$ ). Thus, our manipulation created the intended similar and dissimilar target person profiles for anxious and non-anxious participants alike.

**The effect of anxiety and mindfulness on similarity-attraction.** We regressed anxiety, mindfulness condition, and the interaction between the two onto attraction. We found a main effect of anxiety,  $t[55] = 2.78$ ,  $p < .05$ . Simple slope analysis revealed that, as in Studies 1-3, anxiety reduced the similarity-attraction effect,  $\beta = -.21$ . We also found a main effect of mindfulness,  $t = 2.02$ ,  $p < .05$ , in that participants dis-

played more similarity-attraction effects in the mindful condition than in the control condition,  $\beta = 18$ ,  $p < .05$ . There was no significant interaction between the mindfulness and similarity,  $ts < 1.00$ ;  $ps = ns$ . Figure 5 illustrates our findings.

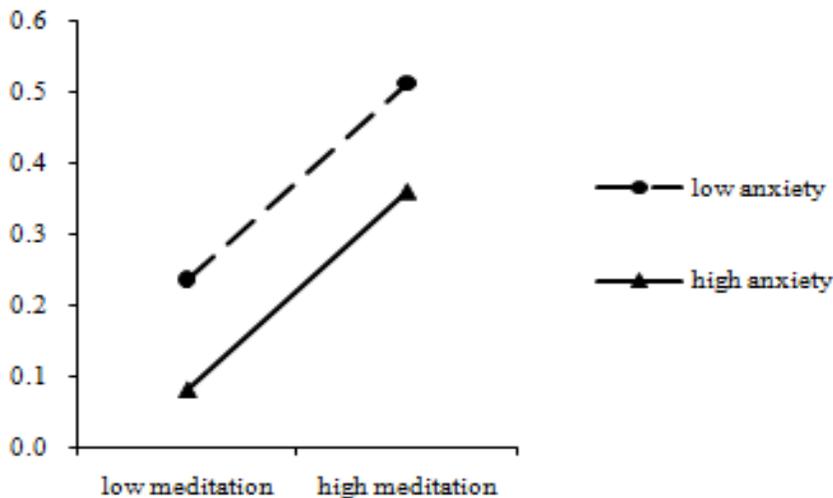


Figure 5. Mean attraction for similar and dissimilar other as a function meditation (mindfulness) manipulation, Study 5.

### Discussion

Study 5 replicated the finding that anxiety the similarity-attraction effect. Moreover, a manipulation of mindfulness increased the similarity-attraction effect, such that mindful participants displayed a stronger preference for similar others control participants. This finding fits with previous findings that mindfulness can help people to bring their intuitive preferences more in line with their overt preferences (see Brown & Ryan, 2003; Koole et al., 2009). However, the effects of anxiety and mindfulness did not interact. It might be that our mindfulness exercise was not sufficient to overcome the effects of anxiety. However, what argues against this possibility is that high-anxious participants did benefit from the exercise. Alternatively, it could be that low-anxious participants are less than fully mindful, so that they too benefited from the mindfulness

exercise. Indeed, prior studies using the same mindfulness exercise have observed effects irrespective of anxiety (Koole et al., 2009).

### General Discussion

In the present research, five studies found converging evidence that anxiety reduces people's tendency to favour others who are similar rather than dissimilar to self, also known as the similarity-attraction effect. Indeed, whereas low-anxious participants consistently favoured similar over dissimilar others, high-anxious participants favoured similar and dissimilar others to an equal degree. This moderation of the similarity-attraction effect by anxiety was found for both spontaneously occurring variations in state anxiety (Studies 1, 3, and 5) and manipulated anxiety (Studies 2 and 4). The similarity-attraction effect were not moderated by trait anxiety (Study 1) or individual differences in attachment anxiety (Study 3). It thus appears that momentary increases in anxiety may inhibit the similarity-attraction effect

Why would anxiety inhibit the similarity-attraction effect? Classic accounts suggest that misattribution of arousal may explain the impact of anxiety on interpersonal attraction (Dutton & Aron, 1974). However, it is not clear on a priori grounds why misattribution of arousal should raise attraction to dissimilar others while leaving attraction to similar others unaffected. Moreover, Study 3 found that high-arousal emotions such as anger and vigour did not moderate the similarity-attraction effect. As such, it seems unlikely that global arousal drove the effects of anxiety. In a related vein, the effects of anxiety did not appear to be driven by general negative mood, given that depression and fatigue did not moderate the similarity-attraction effect. Another possibility is that anxiety keeps people from encoding information related to similarity, perhaps through some kind of distraction process. However, in all of the present studies, anxious and non-anxious participants' could correctly assess whether target persons were more or less similar to self, and anxiety was not associated with poorer memory for similarities and dissimilarities of the target person in Study 1. It therefore seems implausible that distraction explains why anxiety inhibits the similarity-attraction effect.

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impact of anxiety on interpersonal attraction (Dutton & Aron, 1974). However, it is not clear on a priori grounds why misattribution of arousal should raise attraction to dissimilar others while leaving attraction to similar others unaffected. Moreover, Study 3 found that high-arousal emotions such as anger and vigor did not moderate the similarity-attraction effect. As such, it seems unlikely that general arousal drives the effects of anxiety in the present domain. In a related vein, the effects of anxiety do not appear to be driven by general negative mood, given that depression and fatigue did not moderate the similarity-attraction effect. A second possibility is that anxiety keeps people from encoding information related to similarity, perhaps through some kind of distraction process. However, in all of the present studies, anxious and non-anxious participants' could correctly assess whether target persons were more or less similar to the self. Moreover, anxiety was not associated with poorer memory for similarities and dissimilarities of the target person in Study 1. It therefore seems implausible that distraction explains why anxiety may eliminate the similarity-attraction effect.

In our view, the most parsimonious explanation of the present findings is provided by the disruption-of-intuition hypothesis. On the basis of the literature on interpersonal attraction (Clore & Byrne, 1974), we suggest that the similarity-attraction effect is not based solely on the information one has about the other but also on the basis of affective responses to this information, which may be largely intuitive. In line with this idea, participants in Study 2 displayed an implicit preference for similar over dissimilar others, as assessed by an evaluative priming task (Fazio, 2001). Based on the current literature on intuition (Bolte, Goschke, & Kuhl, 2003; De Vries, Holland, & Witteman, 2008; Ruder & Bless, 2003), we further propose that emotionally distressing states such as anxiety may disrupt people's introspective access to the intuitive affective responses towards similar and dissimilar others.

Importantly, Study 2 showed that anxiety fails to eliminate the similarity-attraction effect as assessed by an implicit evaluation task (Fazio, 2001). This implies that anxiety does impair people's introspective access to their intuitive preferences rather than these intuitive preferences themselves. As a result, anxiety may amplify dissociations between im-

PLICIT and explicit evaluations of people's interaction partners. Specifically, high-anxious individuals may explicitly report equal liking for similar and dissimilar others, while implicitly favoring similar over dissimilar others. In the domains of self-esteem and motivation, dissociations between implicit and explicit measures are associated with various signs of inner conflict and stress, such as increased defensiveness (Bosson, Brown, Zeigler-Hill, & Swann, 2003; Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003), and impaired physical and psychological health (Baumann et al., 2005; Shröder-Abé, Rudolph, & Schütz, 2007). It would be important to establish in future research whether anxiety has similar consequences in the interpersonal domain.

Anxiety is not the only condition that may impair introspective access to one's intuitive preferences. Indeed, Study 3 showed that low-anxious individuals too may lose their explicit preference for similar over dissimilar others when they are asked to verbalize their reasons for their evaluation. In addition, individuals primed with a more local processing style in Study 4 showed a decreased tendency for similarity-attraction effect compared with those who were primed with global processing style. This finding fits with prior observations that a narrow processing style may impair access to intuitive preferences (Halberstadt, 2010; Wilson et al., 1989). Similarly, Study 5 showed that mindfulness manipulation, which is associated with more holistic processing of information (Brown, et al., 2007), increased the similarity-attraction effect for both high- and low-anxious individuals. As such, the moderation of similarity-attraction effects by anxiety may be due to cognitive narrowing (Derryberry & Reed, 1998; Easterbrook, 1959; Frederickson & Branigan, 2005). Our findings also show that purely cognitive processes may eliminate the similarity-attraction effect. It seems not necessary to invoke increased strivings for affiliation to explain the effects of anxiety in the present research. Of course, we do not suggest that anxiety and threat never lead to increased affiliation strivings, because prior studies have clearly supported this pattern (e.g., Mikulincer & Shaver, 2003; Taylor, 2006; Wisman & Koole, 2003). However, in the present context, the effects of anxiety may be more parsimoniously understood in terms of impaired access to intuition, without referring to increases in affiliative needs.

On a more general level, the present research has important implications for the interface between emotion and social cognition. Although classic psychological research on anxiety and social behavior began more than five decades ago (Dutton & Aron, 1974; Schachter, 1964), contemporary work has emphasized the intrapersonal consequences of anxiety (Eysenck, Derakshan, Santos, & Calvo, 2007). The present research provides an important complement to this work, by confirming that anxiety plays a key role in the dynamics of interpersonal attraction. Indeed, the present work suggests that anxiety may make people less selective in choosing social interaction partners, by leading people to become equally attracted to individuals who are similar versus dissimilar to themselves. This reduction in social selectivity could have psychological benefits. When people are anxious, others may offer safety and emotional support, even when they are not similar to self. Accordingly, reduced social selectivity may provide anxious individuals with greater opportunities to initiate potentially supportive social relationships.

Reduced interpersonal selectivity may also have costs. A recent study found that, in a speed-dating context, individuals who are more selective in their choice of interaction partners are met more favorably by those interaction partners than less selective individuals (Eastwick, Finkel, Mochon, & Ariely, 2010). As such, by displaying lower social selectivity, high-anxious individuals may come across as desperate and unappealing to others. One might further suspect that, due to their reduced selectivity, anxious individuals could end up with less compatible relationship partners. Indeed, some studies indicate that similarity in personality traits contributes to relationship satisfaction (Barelds & Barelds-Dijkstra, 2007; Luo & Klohnen, 2005). However, other studies indicate that similarity in personality traits has little effect (e.g., Gattis, Berns, Simpson, & Christensen, 2004; Montoya et al. 2009) or even negative effects on relationship satisfaction (Shiota & Levenson, 2007). Thus, it remains unresolved whether greater diversity in personality among interaction partners has longer, positive or negative effects.

### **Limitations and Future Directions**

The present research examined people's first impressions of future interaction partners in a laboratory paradigm, an adaptation of the classic bogus strangers task (Byrne, 1971). Although this paradigm afforded a great deal of experimental control, follow-up studies are needed in more diverse and naturalistic settings. In particular, it would be important to establish whether the present findings extend to forms of similarity other than personality traits. For instance, some studies indicate that anxiety may promote more favorable reactions towards stereotyped groups (e.g., Ciarrochi & Forgas, 1999) and that threatening conditions may lead people to affiliate with ideological opponents (Wisman & Koole, 2003). These and related findings suggest that even though anxiety often promotes stereotypic thinking (Lambert et al., 2003), it may paradoxically foster more favorable reactions towards outgroup members.

Because the present findings were driven by state rather than trait anxiety, our conclusions may apply particularly to the initial stages of relationship formation. However, there are indications that trait anxiety also plays a role in relationship maintenance processes. Specifically, Caughlin, Huston, and Houts (2000) found that trait anxiety predicted greater marital negativity and dissatisfaction but not divorce rates. From the present perspective, this could mean that the negative emotionality associated with anxiety may also keep people from deciding that they really want to end a relationship. More generally, anxiety may also interfere with other relationship processes that depend on having cognitive access to the self's intuitive preferences, such as the Michelangelo effect (Rusbult, Kumashiro, Stocker, & Wolf, 2005) or positive illusions about one's relationships (Murray, Holmes, & Griffin, 1996). Future work needs to examine the role of trait and state anxiety in interpersonal relationships.

### **Concluding Remarks**

At the opening of this article, we described the remarkable case of Patricia Hearst. Based on common sense alone, it seems hard to grasp what could possess an intelligent young woman and heiress to millions to join the terrorist group who had kidnapped her. Indeed, this may be how her jurors reasoned when they pronounced Hearst guilty of bank robbery, a verdict that led to a sentence of 35 years imprisonment. The present

research, however, suggests that Patricia Hearst's actions may be understood in terms of a general tendency in people to become less selective in their interpersonal preferences under anxious conditions. Fortunately for Hearst, subsequent officials seemed more willing to acknowledge her unusual circumstances. Her prison sentence was commuted by President Carter during the 1970s, so that Hearst was released from prison after less than two years. Moreover, in 2001, Hearst was pardoned by President Clinton in one of his last acts in office (Ewing & McCann, 2006).



## Chapter 4:

### Maintaining Close Relationships:

#### Gratitude as a Motivator and a Detector of Maintenance Behaviour<sup>4</sup>

The present research examined the dual function of gratitude for relationship maintenance in close relationships. In a longitudinal study among married couples, we tested the dyadic effects of gratitude over three time points for approximately four years following marriage. We found that feelings of gratitude toward a partner stem from the partner's relationship maintenance behaviors, partly because such behaviors create the perception of responsiveness to one's needs. In turn, gratitude motivates partners to engage in relationship maintenance. Hence, the present model emphasizes that gratitude between close partners a) *originates* from partners' relationship maintenance behaviors and the perception of a partner's responsiveness; and b) *promotes* a partner's reciprocal maintenance behaviors. Thus, our findings add credence to our model, in that gratitude contributes to a reciprocal process of relationship maintenance, whereby each partner's maintenance behaviors, perceptions of responsiveness, and feelings of gratitude feed back on and influence one another's behaviors, perceptions, and feelings.

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<sup>4</sup>**This chapter is based on:** Kubacka K.E., Finkenauer C., Rusbult, C.E. & Keijsers, L. (2010). *Maintaining close relationships: Gratitude as a motivator and a detector of maintenance behaviour*. Manuscript submitted for publication.

*Let us be grateful to people who make us happy, they are the charming gardeners who make our souls blossom.*

- Marcel Proust

The quote by Proust encourages people to be grateful to those who make them happy. According to a survey among British citizens commissioned by the BBC, people's biggest source of happiness are close relationships, including partners, family, and friends (BBC poll on 'Happiness', 2005). Although the benefits of gratitude have been extensively investigated (cf. McCullough, Kimeldorf, & Cohen, 2008), we know surprisingly little about the functions of gratitude in close, ongoing relationships. Indeed, existing research mainly investigates gratitude in relationships among strangers or newly acquainted others (e.g., Algoe, Haidt, & Gable, 2008; Dunn & Schweitzer, 2005; Fredrikson, Cohn, Coffey, Pek, & Finkel, 2008). The present work aims to fill this gap in our understanding of the social functions of gratitude by examining its functions in close relationships over time, focusing on gratitude experienced by, and toward, spouses.

Thus, the core premise of the present research is that the benefits of gratitude extend beyond initial interactions to ongoing relationships. Extending existing research showing that gratitude among strangers motivates people to engage in costly pro-social behaviors (Bartlett & DeSteno, 2006), we propose that gratitude motivates pro-relationship behavior toward partners in ongoing relationships. In these relationships too, people receive benefits their partner, in that they allow people to satisfy the central and fundamental need to belong (e.g., Baumeister & Leary, 1995) and serve as a primary source of support, comfort, and intimacy (e.g., Reis & Shaver, 1988; Wieselquist, Rusbult, Agnew, & Foster, 1999). At the same time, close relationships are costly to individuals. To maintain close relationships people need to invest work and effort (Staford & Canary, 1991) and to overcome selfish impulses for the good of the relationship (e.g., Rusbult, Verette, Whitney, Slovik, & Lipkus, 1991). Hence, we propose that close relationships offer a context in which gratitude can arise and at the same time stimulate partners to engage in the often costly maintenance behaviors.

Moreover, because gratitude is an inherently social emotion that results from others' positive or exemplary actions (Haidt, 2003a; McCullough, Kilpatrick, Emmons, & Larson, 2001), and because perceived partner responsiveness and relationship maintenance behaviors are inherently relational phenomena (e.g., Reis & Shaver, 1988), we propose that the effects of gratitude have dyadic consequences in that one partner's efforts to maintain the relationship should elicit feelings of gratitude in the other partner. Thus, we propose a dyadic model of gratitude in close relationships whereby gratitude serves a dual function: detecting partner responsiveness and motivating maintenance behavior. We test this model in a prospective, longitudinal study among a large sample of newlywed couples. The present research thereby allows us to examine whether and how the interplay between gratitude and relationship maintenance unfolds over time.

### **The Dual Function of Gratitude in Close Relationships**

Gratitude is a positive feeling that beneficiaries experience toward their benefactor. People feel grateful when they benefit from costly, intentional, and voluntary actions or efforts of a benefactor which are valuable to them (McCullough et al., 2001; Tesser, Gatewood, & Driver, 1968). It is an other-praising emotion, which involves different components, including the cognitive appraisal that the other did good deeds for the self, the feeling of gratitude, a sense of appreciation for the other, and the motivation or action tendency to repay the other (Algoe & Haidt, 2009; Lambert, Graham, & Fincham, 2009). The literature distinguishes between *benefit-triggered* and *generalized* gratitude (Lambert et al., 2009). Benefit-triggered gratitude is elicited by a specific transfer of a benefit, while generalized gratitude includes being grateful for which is valuable and meaningful to oneself. In close relationships benefits are given noncontingently to a partner's needs (Clark & Mills, 1979). Consequently, the present research considers the generalized type of gratitude and applies it to marital partners. We examine gratitude in marital relationships and view it as the partner-praising emotion, akin to appreciation (Adler & Fagley, 2005): a positive emotional connection to the partner, which is not triggered by a specific benefit but by the acknowledgement and appreciation of a partner's value to the self.

Research confirms that gratitude not only serves as a detector that alerts people that they have benefited from prosocial behavior (McCullough et al., 2001), it also serves as a motivator for beneficiaries to engage in prosocial behavior after having received benefits from others (Bartlett & DeSteno, 2006; for a review see McCullough, et al., 2008). This dual function of gratitude in relationships is proposed to serve the promotion of relationships with responsive others. First evidence for this suggestion is provided by Algoe and colleagues in an ingenious study among sorority sisters (Algoe et al., 2008). These researchers used a naturally occurring gratitude intervention in sororities, gift-giving week, in which senior sisters give gifts to new sisters to welcome them. This way the authors studied the effects of gratitude on relationship formation between the new sister and the senior sister who had given her a gift. Confirming the detection function of gratitude, new sisters experienced more gratitude the more they rated the gift as thoughtful. Although the authors did not examine the motivational function of gratitude, they found that gratitude had effects for the relationship between benefactors and beneficiaries. New sisters' gratitude after the gift-giving predicted the relationship quality of both new and senior sisters at a one-month follow-up. Hence, even an incidental act of gift-giving can inspire enough gratitude to facilitate relationship formation between strangers.

Extending these findings to close relationships, we propose that gratitude emerges when people perceive that their partner engages in costly relationship maintenance behavior and that this behavior is responsive to their needs. Importantly, we suggest that these feelings of gratitude motivate people to engage in the costly maintenance behaviors themselves. Their efforts at maintaining the relationship, in turn, benefit their partner who should experience gratitude upon detecting that people engage in efforts to maintain the relationship (Figure 1 presents a schematic presentation of our model). Thus, we propose that gratitude serves a dual function in close relationships which facilitates relationship maintenance.

### **Gratitude as a detector of perceived partner responsiveness.**

Gratitude is conceptualized as a positive emotion that is relevant to the processing of and responding to prosocial behavior (McCullough et al., 2008). Given its emotional qualities researchers have recognized that

gratitude serves to coordinate social interaction and behavior. It results from beneficiaries' appraisal of the benefactor's thoughtful actions (Algoe et al., 2008; Tsang, 2006). It shapes beneficiaries' motivations to be prosocial, both toward the benefactor (Bartlett & DeSteno, 2006) and others in general (Algoe & Haidt, 2009).

In close relationships, thoughtful actions by the partner are perceived as being responsive to one's needs (Reis, Clark, & Holmes, 2004). Partner responsiveness occurs when people feel that a partner addresses their needs, wishes, or actions. By being responsive, partners communicate understanding, acceptance, and caring to each other. Being responsive thereby is crucial for processes that are at the heart of close relationships, including trust, commitment, and intimacy (Laurenceau, Feldman Barrett, & Pietromonaco, 1998; Reis et al., 2004). Not surprisingly, perceived responsiveness is considered as being a key appraisal to elicit gratitude (Algoe et al., 2008).

Although Algoe et al. (2008) found that the extent to which new sorority sisters appraised their gift as thoughtful determined their gratitude, it is unclear whether gratitude can result from perceived partner responsiveness in close, ongoing relationships. In contrast to relationships between strangers, close relationships are less exchange oriented (Clark & Mills, 1979), and partners do not, or at least much less, keep track of the giving and receiving of benefits. Nevertheless, we propose that also in the context of close relationships gratitude serves as a detector for people's perception that their partner is responsive to their needs and invests efforts in maintaining the relationship. We suggest that effortful relationship maintenance behavior is diagnostic of a pro-relationship orientation (Wieselquist et al., 1999) and provides unambiguous evidence that the partner cares for and values the self. To illustrate, Marieke should feel particularly grateful towards Jan when she perceives that Jan tries to include her family and friends in their activities, because he knows that they are important to her. Thus even in close relationships perceived partner responsiveness should be associated with gratitude.

**Gratitude as a motivator of relationship maintenance behavior.** The emotional qualities of gratitude also shape people's motivations and goals. Gratitude motivates people to engage in prosocial behavior towards others in general (Bartlett & DeSteno, 2006). Again it re-

mains unclear whether gratitude may motivate prosocial behavior in close relationships in which partners do not keep track of their exchanges but are motivated to be responsive to the other person's needs (Clark & Mills, 1979). Again, we propose that in close relationships too, gratitude should motivate people to act prosocially and engage in efforts to maintain their relationship even at costs to the self. Abundant research shows that partners engage in relationship maintenance behaviors in order to sustain desired relationships (e.g., Badr & Carmack Taylor, 2008; Canary, Stafford, & Semic, 2002; Finkel & Campbell, 2001). Relationship maintenance behavior comprises a variety of different strategies, ranging from habitual, routine behaviors (e.g., taking out the garbage on Tuesdays; Dainton & Stafford, 1993) to strategic and effortful behavior (e.g., engaging in constructive responses when the partner is destructive, Finkel & Campbell, 2001; performing one's responsibilities, Dainton & Stafford, 1993). Research confirms that people's own maintenance behaviors as well as perceptions of partner's maintenance behaviors lead to greater commitment, liking, and satisfaction in close relationships (Canary & Stafford, 1994; Stafford & Canary, 1991). Thus, we propose that in the context of close relationships gratitude serves as a motivator for people's effortful maintenance behavior.

Moreover, given that maintaining one's relationships is a task that remains important over the whole course of a relationship, we propose that gratitude remains beneficial as relationships progress over time. In fact, a true test of whether gratitude helps spouses in maintaining their marriages lies in showing that the effects of gratitude hold as time passes. After all most people enter marriages being extremely optimistic and happy, but a considerable percentage of marriages end in divorce and research shows that over the course of marriages marital satisfaction steadily declines (Vaillant & Vaillant, 1993). The present research examines the dual function of gratitude both cross-sectionally and longitudinally, thereby examining whether the dyadic model of gratitude remains important over the course of marital relationships, and whether the dual function of gratitude predict relationship maintenance over time.

**Dyadic effects of gratitude.** Gratitude has social effects in that it promotes the relationship formation between unknown beneficiaries and their benefactors (Algoe et al., 2008). Because gratitude is argued to also

affect relationship maintenance (e.g., Algoe & Haidt, 2009), it is critical to examine how gratitude can have effects on both partners in close relationships. Grant and Gino (2010) examined how the expression of gratitude by one person affected helpers' prosocial behavior. In a series of experimental and field studies, they consistently found that the expression of thanks affected a variety of helper behaviors, including providing assistance for a second time, making phone calls for fundraisers, and time spent helping. Importantly, they found that when helpers were thanked for their efforts, they felt socially valued and, in turn engaged in more helping behavior. These findings further emphasize the crucial role of feeling cared about and valued by others in eliciting gratitude and prosocial behavior.

Extending these findings to marital relationships, we predict that people's efforts in maintaining their relationships do not go unnoticed by their partners. Rather partners detect these efforts, which communicate that the other cares for and values the relationship and the self. Thus, we predict that maintenance behaviors by one partner elicit feelings of perceived partner responsiveness in the other. These feelings, in turn, should result in feelings of gratitude. To illustrate, when Marieke perceives that Jan does his chores in the household, she feels that he cares for and values her, and that he is responsive to her needs. Consequently, she experiences gratitude which motivates her to engage in similar efforts to maintain the valued relationship with Jan.

### **Overview of the Present Research**

**Testing the dual model of gratitude.** The present research aims to test the dyadic model of gratitude in close relationships where gratitude serves both as a detector of perceived partner responsiveness and as a motivator for effortful maintenance behavior. Importantly, we propose that these processes affect both partners in relationships. Specifically, we predict that when Partner A perceives Partner B to be responsive to her needs, she experiences gratitude (Hypothesis 1). Partner A's gratitude, in turn, motivates her to invest more efforts in maintaining her relationship with Partner B (Hypothesis 2). Moreover, we predict that Partner A's maintenance behavior is noticed by Partner B who feels cared about and valued by Partner A. Consequently, Partner B should perceive that Partner A is responsive to his needs (Hypothesis 3) and should feel grateful

(Hypothesis 4). In addition to this direct effect of Partner A’s maintenance behavior on Partner B’s gratitude, we predict that Partner A’s maintenance behavior indirectly affects B’s gratitude via Partner B’s perception that Partner A is responsive to his needs (Hypothesis 5). The experience of gratitude should then motivate Partner B to engage in more maintenance behavior (cf. Hypothesis 2).

Figure 1 presents a schematic representation of our model. We tested our model in a large sample of newlywed couples in which we obtained data from both partners at three data collections. We tested whether the predicted dual function of gratitude as a detector and motivator of relationship maintenance holds across different stages of the early years of marriage. To this end, we test the validity of our model within each of the three different time points and also tested whether the longitudinal effects vary across time.

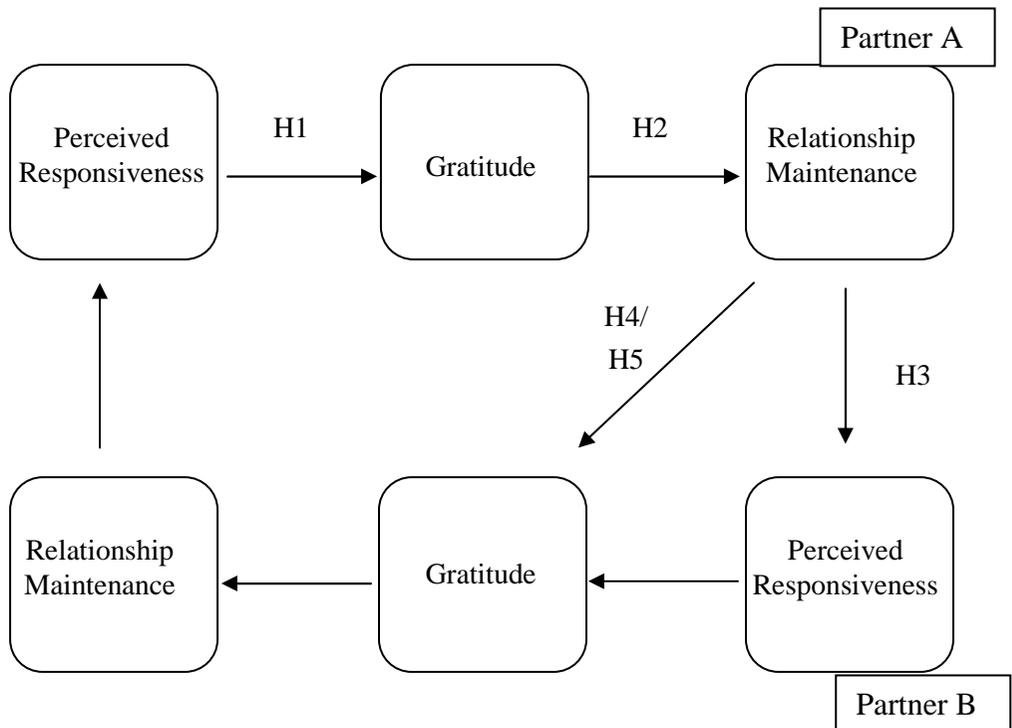


Figure 1. A Dyadic Model of the Dual Function of Gratitude in Close Relationships: Gratitude as a motivator and a detector of relationship maintenance behaviour. The figure illustrates model variables and hypotheses (H1-5 = Hypotheses 1-5).

Given the dyadic nature of our model, some predictions involve intrapersonal associations (Hypotheses 1 and 2) and others interpersonal associations (Hypotheses 3, 4, and 5). For the longitudinal test, we merely extended these hypotheses over time. For example, for the intrapersonal path we predicted that when Partner A perceives Partner B to be responsive to her needs at an earlier time point, she should experience gratitude at a later time point (Hypothesis 1a). Partner A's gratitude at an earlier time point, in turn, should motivate her to invest more efforts in maintaining her relationship with Partner B at a later time point (Hypothesis 2a). Similarly, for the interpersonal pathway, we predicted that if Partner A engages in relationship maintenance, Partner B should perceive that Partner A is responsive to his needs at later time point (Hypothesis 3a) and should feel grateful at a later time point (Hypothesis 4a).

We did not anticipate meaningful sex differences in the strength of association among variables. We therefore refer to "Partner A" and "Partner B" and do not distinguish between partners in our hypotheses. To explore the possibility of sex differences, we tested main effects and interactions for sex in all analyses.

**Testing alternative hypotheses.** To test the validity of our model, we performed all analyses controlling for relationship satisfaction and relationship duration. Relationship maintenance is conducive to relationship satisfaction (Stafford & Canary, 1991), which may have a positive relation with all our model variables. To diminish the possibility that gratitude is an artifact of positive feelings toward the partner, we controlled for relationship satisfaction when examining our model. Additionally, we explored the possibility that gratitude and relationship satisfaction interact in relationship maintenance. Specifically, it is possible that the effects of gratitude vary as a function of relationship satisfaction. For instance, gratitude may be more beneficial for the less happy couples than the happy couples, because it may provide them with the extra boost to make the relationship work.

Relationship duration is an important variable in the present context, because it allows us to test whether gratitude carries relational meaning after the establishment of reciprocal relationships. In light of the existing literature (McCullough et al., 2008) one could argue that gratitude is especially important in the beginning of a relationship. Over time

it may become less important. As couples build their relationship, other variables, such as investments (Rusbult, 1983), may become more important determinants of relationship maintenance. Hence, we wanted to make sure that gratitude benefits relationships of differing length. For this purpose we wanted to also exclude the possibility that experience of gratitude interacts with relationship duration, such that relationships of shorter duration benefit from the experience of gratitude more than those of longer duration.

## Method

### Participants

We used data from three time points of a longitudinal project designed to measure different aspects of marital functioning. At Time 1 our sample included 195 newlywed couples (this data has been previously used in the analysis of the paper by Kubacka et al., 2010). The mean age of husbands was 32.07 years ( $SD = 4.86$ ) and the mean age of wives was 29.20 years ( $SD = 4.28$ ). Couples had been romantically involved on average for 5.77 years ( $SD = 3.07$ ), and had been living together for an average of 3.81 years ( $SD = 2.31$ ). Nearly all couples were Dutch (98.5% of the husbands and 96.4% of the wives). At the time of Time 2 data collection, 190 couples remained (97% of the original sample); while at the time of Time 3 data collection 157 couples remained (75% of the original sample). To estimate the pattern of missing values, we conducted Little's (1988) Missing Completely at Random (MCAR) test. Although this very stringent test was significant ( $\chi^2 = 24.053$ ,  $df = 13$ ,  $p = .031$ ), the  $\chi^2/df$  ratio of 1.10 indicated a good fit between sample scores with and without imputation (Bollen, 1989). Moreover, in our sample if one partner is not participating also the other partner resigns, thus this is likely to have influenced the test result. Therefore, we used Full Information Maximum Likelihood (FIML: Enders & Bandalos, 2001) to estimate our models in *Mplus* (Muthen & Muthen, 2006).

### Procedure

Participants were recruited via the municipalities in which they got married. Each month eight Dutch municipalities of moderate to large cities in the Netherlands provided the names and addresses of all couples who had gotten married in the previous month. The municipalities were in average sized Dutch cities mostly in the South of the country. The

present data comes from a larger set of longitudinal panel study which started in September 2006. The present data was gathered about nine months later (i.e., about 10 months after the couples got married). For all the couples in the study, we verified that: a) this was the couple's first marriage; b) the couples had no children prior to the marriage; and c) the partners were between 25 and 40 years old.

Both members of the couple separately filled out an extensive questionnaire at home in the presence of a trained interviewer. The presence of the interviewer ensured that partners independently completed the questionnaires without consulting each other. The questionnaire took about 90 minutes to complete. For their participation the couples received 15 Euros and pen-set. To increase participants' commitment to the study, we sent birthday cards to each participant. Also, participants were able to get updates about the progress of the study via the study website. This procedure was repeated approximately 12 months later for Time 2, and another 12 months later for Time 3. Thus, the present study covers a period of about 2 years and nine months after the couples got married.

### Measures

**Gratitude.** We assessed gratitude using a 4-item questionnaire adapted from work by McCullough and colleagues (McCullough, Emmons, & Tsang, 2001). Partners rated the extent to which they felt grateful to each other (e.g., "If I were to make a list of everything I am grateful for to my wife (husband), it would be a very long list."). The items were rated on a 5-point scale (1 = *not at all*, 5 = *very much*). Responses were averaged to yield a gratitude score; higher values indicated greater gratitude (Cronbach's alpha = .78 for husbands and .80 for wives).

**Perceived partner responsiveness.** An 18-item questionnaire was used to assess partner responsiveness (conceptually modelled consistent with the work of Reis & Shaver, 1988). Partners rated the degree to which they felt their wife (husband) accepts them (e.g., "My wife (husband) values and respects me."), understands them (e.g., "My wife (husband) fully understands me."), and cares for them (e.g., "My wife (husband) tries to fulfil my needs"). The items were rated on a 5-point scale (1 = *not at all*, 5 = *very much*). Responses were averaged to yield a responsiveness score; higher values indicated greater responsiveness (Cronbach's alpha = .94 for husbands and .93 for wives).

**Relationship maintenance.** To assess relationship maintenance behaviors, this study used the strategic and routine maintenance behaviors measure by Dainton and Stafford (1993). From the original list, we selected 15, mostly strategic, behaviors which are conscious and intentionally enacted for the purpose of sustaining the relationship and can be considered effortful in that they describe behavior that indicates a departure from self-interest for the benefit of the relationship (e.g., “I encourage my wife (husband) to share her feelings with me.” “I offer to do things that aren’t “my” responsibility.”). Partners indicated whether they engaged in a specific behavior with their wives (husbands) over the course of a previous week (e.g., “Did you stress your commitment to your wife over the past week?” “Did you try to solve a conflict together with your wife over the past week?”) (1 = *no*, 2 = *yes*). Responses were summed up to create a relationship maintenance score; higher values indicated greater relationship maintenance

**Relationship satisfaction.** We measured relationship satisfaction using the Dyadic Adjustment Scale (Spanier, 1976). The scale taps components of couple functioning such as agreement regarding important values conflict management, and expressions of love and affection (e.g., “Do you confide in your partner?”; 0 = *never*, 5 = *all the time*; Cronbach’s alpha = .80 for men and .81 for wives). Responses were summed to create a relationship satisfaction score; higher values indicated greater relationship satisfaction.

**Relationship duration.** Participants reported the length of their relationship in months at the time of the first assessment (Time 1).

## Results and Discussion

**Analysis strategy.** With distinguishable partners of a dyad (in the case of husbands and wives, partners are distinguished by their gender), we were able to use traditional SEM procedures for estimating and identifying of models and assessing model fit (Olsen & Kenny, 2006). More specifically, we used the Actor Partner Interdependence Modeling (APIM) - a specific type of cross-lagged panel analyses (Kenny, 1996). In our statistical program *Mplus*, all cases, even those with missing data points, could be included using Full Information Maximum Likelihood estimation. All variables were standardized prior to conducting the analyses. In addition, initial analyses included gender as a lower level varia-

ble; fewer than 4% of the gender effects were significant, so we dropped this variable from the analyses. The means and standard and the within-individual and cross-partner correlations are presented in Table 1.

Table 1. Means, standard deviations and correlations for all the assessed variables.

Variable	<i>M</i> ( <i>SD</i> )	Correlation coefficients				
		1)	2)	3)	4)	5)
<u>Time 1 :</u>						
1) Gratitude	4.10 (0.54)	<b>.16**</b>	.17**	.22**	.21**	.04
2) PPR	4.22 (0.42)	.50**	<b>.28**</b>	.14**	.27**	.14**
3) Maintenance	17.84 (2.18)	.26**	.22**	<b>.27**</b>	.07	.08
4) Rel. Satisfaction	111.14 (10.42)	.43**	.55**	.21**	<b>.31**</b>	.09
5) Rel. Duration	5.77 (3.07)	.04	.14**	.08	.09	-
<u>Time 2:</u>						
1) Gratitude	4.06 (0.58)	<b>.24**</b>	.26**	.23**	.24*	-
2) PPR	4.16 (0.45)	.58**	<b>.38**</b>	.16**	.32**	-
3) Maintenance	17.13 (2.18)	.31**	.22**	<b>.21**</b>	.12*	-
4) Rel. Satisfaction	110.53 (10.89)	.54**	.63**	.12**	<b>.42**</b>	-
<u>Time 3:</u>						
1) Gratitude	4.09 (0.59)	<b>.15**</b>	.27**	.11*	.22**	-
2) PPR	4.13 (0.48)	.57**	<b>.30**</b>	.20**	.24**	-
3) Maintenance	17.09 (2.53)	.36**	.20**	<b>.24**</b>	.11*	-
4) Rel. Satisfaction	109.93 (11.40)	.52**	.61**	.30*	<b>.30**</b>	-

*Note:* The numbers on and above the diagonal lines (in bold) illustrate across partner correlations between model variables, while the correlations below the diagonal lines illustrate within-individual correlations. PPR = perceived partner responsiveness, \*\* $p < .01$ , \* $p < .05$ .

The longitudinal models were conducted per pair of variables (which were standardized a priori), in order to ensure sufficient statistical power for the model (Kline, 2005). Hence, for Hypothesis 1, we ran an APIM for males' and females' Gratitude and Responsiveness (see Figure 2). This procedure was repeated for each pair of analyses. We ran two subsequent tests on each model. First, we tested whether the effects were time variant or invariant by constraining the cross-lagged effects to be

equal for T1-T2 and T2-T3 intervals. When the chi-square difference between such unconstrained and constrained model was significant, the parameters were found to be time variant. With non-significant chi-square increase, the more parsimonious time invariant model was chosen. Second, we tested whether the cross-lagged effect were similar or different for husbands and wives. This was also done with use of chi-square difference tests. We compared a constrained model with parameters being set equal for husbands and wives with a model in which these parameters were not constrained. A significantly poorer fit of the constrained model (i.e., higher chi-square value) would indicate gender differences. With non-significant chi-square increase, the more parsimonious gender invariant model was chosen.

**Predicting key model variables.** The analyses concerning Hypotheses 1 and 2 involved the intrapersonal pathway, while Hypotheses 3 to 5 concerned analyses regarding the interpersonal pathway. We first performed the analyses using data from Time 1. Specifically, to test Hypothesis 1, the signaling function of gratitude, we regressed Partner A's perception of Partner B's responsiveness onto Partner A's gratitude. Consistent with our hypothesis, Partner A's perception of B's responsiveness was significantly associated with Partner A's gratitude ( $B = .52, p < .01$ ). To test the role of gratitude as a motivator of relationship maintenance we regressed Partner A's gratitude onto Partner A's report of Partner A's maintenance behavior. Consistent with Hypothesis 2, Partner A's gratitude was significantly associated with his or her maintenance behaviors ( $B = .23, p < .01$ ). To test the dyadic role of gratitude as a detector of relationship maintenance, we regressed Partner A's maintenance onto Partner B's perception of Partner A's responsiveness. As predicted by Hypothesis 3, Partner A's maintenance behavior was significantly associated with Partner B's perception of Partner A's responsiveness ( $B = .10, p < .05$ ). Finally, to test Hypothesis 4 we regressed Partner A's maintenance behavior onto Partner B's gratitude. As predicted, Partner A's maintenance behavior was significantly associated with Partner B's gratitude ( $B = .14, p < .01$ ). The same analyses were then conducted on the data from Times 2 and 3. The dyadic model of gratitude held within each of the time points for both the intrapersonal and the interpersonal

effects. The associations for the Times 2 and 3 are reported in Tables 3 and 4 respectively.

Taken together our results confirm the dual function of gratitude as a detector and motivator of relationship maintenance behavior. For each of the three time points, we found support for the dyadic model of gratitude, finding that gratitude acted as a detector of relationship maintenance and that gratitude acted as a motivator of relationship maintenance within the individual and also for the partner.

**Mediation analyses.** To test whether perceived partner responsiveness mediates the link between Partner A's maintenance behavior and Partner B's gratitude (Hypothesis 5), we performed a mediation analysis (Baron & Kenny, 1986; Kenny, Kashy, & Bolger, 1998). Consistent with the model displayed in Figure 1, a Sobel's test confirmed that Partner A's maintenance behavior resulted in Partner B's gratitude partly because it fostered Partner B's perception that Partner A is responsive to his or her needs at all the three time points ( $z_s = 1.96, 1.97, \text{ and } 1.96$  for Times 1 -3 respectively;  $p < .05$ ).

**Controlling for relationship satisfaction and relationship duration.** To test the validity of our model, we tested whether it held above and beyond relationship satisfaction and duration. To this end we first performed all analyses on the key model variables and the mediation analysis including relationship satisfaction, using the Dyadic Adjustment Scale (DAS). The analyses included both the main effect of relationship satisfaction and the interaction between satisfaction and model predictors. We first analyzed the data from Time 1, the results can be seen in Table 2, when controlling for relationship satisfaction of Partner A; and of Partner B for Hypotheses 3 and 4.

All key model predictors remained significant, even though relationship satisfaction showed a significant and positive relation with the model variables. Specifically, Partner A's satisfaction is related to A's gratitude ( $B = .20, p < .01$ ), and A's relationship maintenance ( $B = .12, p < .01$ ), as well as Partner B's perception of Partner A's responsiveness ( $B = .23, p < .01$ ), and Partner B's gratitude ( $B = .21, p < .01$ ). Also, Partner B's satisfaction contributes to his or her own perception of Partner A's responsiveness ( $B = .63, p < .01$ ) and his or her own gratitude ( $B = .47, p$

< .01). In addition, we tested Hypothesis 5 by including Partner A's and Partner B's relationship satisfaction in our analyses.

Table 2. *Hypotheses 1 to 4: Regression Analyses Results for Model Variables, Controlling for Relationship Satisfaction, at Time 1.*

Variable	Regression B	Analyses t
<u>H1: A's Perception of B's Responsiveness → A's Gratitude</u>		
A's Gratitude		
A's Perception of B's Responsiveness	.41**	7.53
Satisfaction	.20**	3.54
<u>H2: A's Gratitude → A's Relationship Maintenance</u>		
A's Relationship Maintenance		
A's Gratitude	.18**	3.30
Satisfaction	.12*	2.16
<u>H3: A's Relationship Maintenance → B's Perception of A's Responsiveness</u>		
B's Perception of A's Responsiveness		
A's Relationship Maintenance (with A's satisfaction)	.10*	2.11
A's Relationship Maintenance (with B's satisfaction)	.10*	2.49
B's Satisfaction	.63**	14.78
A's Satisfaction	.23**	4.61
<u>H4: A's Relationship Maintenance → B's Gratitude</u>		
B's Gratitude		
A's Relationship Maintenance (with A's satisfaction)	.15**	3.04
A's Relationship Maintenance (with B's satisfaction)	.16**	3.49
A's Satisfaction	.21**	4.35
B's Satisfaction	.47**	10.35

Note: \*\* $p < .01$ , \* $p < .05$

The results remained largely unchanged. Partner B's responsiveness partly mediated the relation between Partner A's maintenance behavior and Partner B's gratitude, when controlling for Partner A's relationship satisfaction,  $z = 1.95$ ,  $p = .05$ . When controlling for Partner B's relationship satisfaction, again the mediation was partial but significant,  $z = 2.35$ ,  $p < .02$ . The analogical analyses for data gathered at Times 2 and 3

are presented in Table 4. Taken together, the results support our claim that gratitude facilitates relationship maintenance behaviors above and beyond relationship satisfaction. Thus, even four years after the marriage (that is about the point of Time 3 data collection) gratitude benefited relationships of couples with differing levels of relationship satisfaction.

Table 4. *Hypotheses 1-4, Time 2 and 3 (T2 and T3): Regression Analyses Results for Model Variables, Controlling for Relationship Satisfaction*

Variable	Regression Analyses	
	B	t
<u>H1: A's Perception of B's Responsiveness → A's Gratitude</u>		
A's Gratitude		
A's Perception of B's Responsiveness, T2:	.39** (.57**)	7.55 (13.47)
A's Perception of B's Responsiveness, T3:	.41** (.58**)	7.44 (12.86)
<u>H2: A's Gratitude → A's Relationship Maintenance</u>		
A's Relationship Maintenance		
A's Gratitude, T2:	.22** (.29**)	3.78 (5.96)
A's Gratitude, T3:	.28** (.35**)	4.70 (6.75)
<u>H3: A's Relationship Maintenance → B's Perception of A's Responsiveness</u>		
B's Perception of A's Responsiveness		
A's Relationship Maintenance, T2:	.09† (.11*)	1.76 (1.99)
A's Relationship Maintenance, T3:	.16** (.16**)	2.68 (2.83)
<u>H4: A's Relationship Maintenance → B's Gratitude</u>		
B's Gratitude		
A's Relationship Maintenance, T2:	.16** (.19**)	3.67 (3.77)
A's Relationship Maintenance, T3:	.08† (.09†)	1.70 (1.72)

*Note:* Estimates for model variables when controlling for relationship satisfaction (with estimates without relationship satisfaction in the brackets). \*\* $p < .01$ , \* $p < .05$ , † $p = .08$

Second, we conducted the analyses controlling for relationship duration and the interaction between relationship duration and model predictors. Again, our model remained largely unchanged, and duration did not emerge as a significant predictor in any of the analyses (all  $ps >$

.10), except for the analyses testing Hypothesis 3. When including relationship duration, Partner A's relationship maintenance became a marginally significant predictor of Partner B's perception of Partner A's responsiveness ( $B = .10, p = .05$ ), whereas relationship duration was a significant predictor ( $B = .04, p < .04$ ). This finding suggests that the longer the duration of the marriage the more spouses perceived responsiveness in each other, independent of their actual maintenance behaviors. Overall, we found no significant interactions between relationship duration and model predictors. We also tested Hypothesis 5 by including relationship duration in our analyses, the results remained largely unchanged (the test of partial mediation by Partner B's responsiveness was marginally significant,  $z = 1.92, p < .06$ ). Table 3 presents the results of the regression analyses for model variables, when controlling for relationship duration using data from Time 1 (since duration of relationship does not provide novel information for the analyses of data from Times 2 and 3). Thus, gratitude benefitted relationships of differing length equally.

Table 3. *Hypotheses 1 to 4: Regression Analyses Results for Model Variables, Controlling for Relationship Duration, at Time 1.*

Variable	Regression <i>B</i>	Analyses <i>t</i>
<u>H1: A's Perception of B's Responsiveness → A's Gratitude</u>		
A's Gratitude		
A's Perception of B's Responsiveness	.53**	11.92
<u>H2: A's Gratitude → A's Relationship Maintenance</u>		
A's Relationship Maintenance		
A's Gratitude	.22**	4.47
<u>H3: A's Relationship Maintenance → B's Perception of A's Responsiveness</u>		
B's Perception of A's Responsiveness		
A's Relationship Maintenance	.10†	1.94
Relationship duration	.04*	2.33
<u>H4: A's Relationship Maintenance → B's Gratitude</u>		
B's Gratitude		
A's Relationship Maintenance	.14**	2.69

Note: \*\* $p < .01$ , \* $p < .05$  † $p = .05$

**Testing the model longitudinally.** We first tested Hypothesis 1 whereby perceived partner responsiveness should be associated with gratitude. Figure 2 shows that responsiveness was positively associated with gratitude for all the time points. In addition, we found the reverse effect whereby gratitude predicted perceived partner responsiveness over time. The model was gender-invariant ( $\Delta X^2 = 2.46$ ,  $df = 2$ ,  $p = .29$ ), and time-invariant ( $\Delta X^2 = 5.96$ ,  $df = 4$ ,  $p = .21$ ). Comparing the two models showed that the effect size of the predicted path was significantly stronger than that of the reverse path ( $\Delta X^2 = 10.7$ ,  $df = 1$ ,  $p < .001$ ). Thus, over time perceived partner responsiveness predicted gratitude.

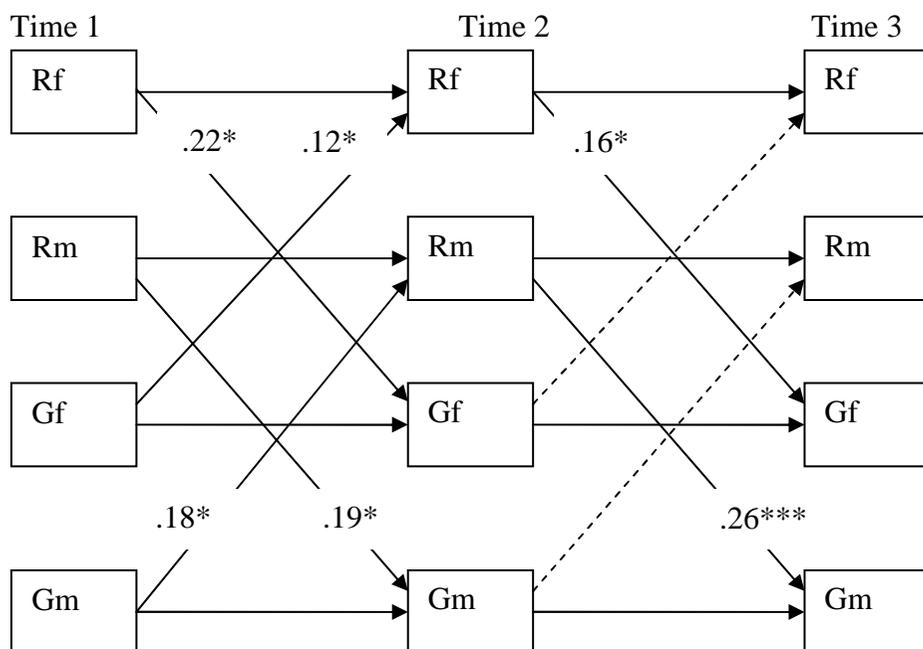


Figure 2. Cross-Lagged APIM-based analyses of Responsiveness (R) and Gratitude (G), the subscript “f” indicates wives and “m” indicates husbands, including all Time 1, Time 2, and Time 3 cross-lagged within and between partner effects. Only significant effects are shown. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Next, we tested Hypothesis 2 whereby the experience of gratitude should motivate the self to engage in relationship maintenance. Figure 3 shows that gratitude held a positive significant relationship with relationship maintenance over time. The model was gender-invariant ( $\Delta X^2 =$

1.00,  $df = 2$ ,  $p = .61$ ), and time-invariant ( $\Delta X^2 = 3.49$ ,  $df = 4$ ,  $p = .49$ ). In addition, we found the reverse effect whereby relationship maintenance predicted gratitude over time. Comparing the two models showed that the effects size of the predicted path was significantly stronger than that of the reverse path ( $\Delta X^2 = 6.82$ ,  $df = 1$ ,  $p < .001$ ). Hence, consistent with Hypothesis 2, gratitude predicted relationship maintenance.

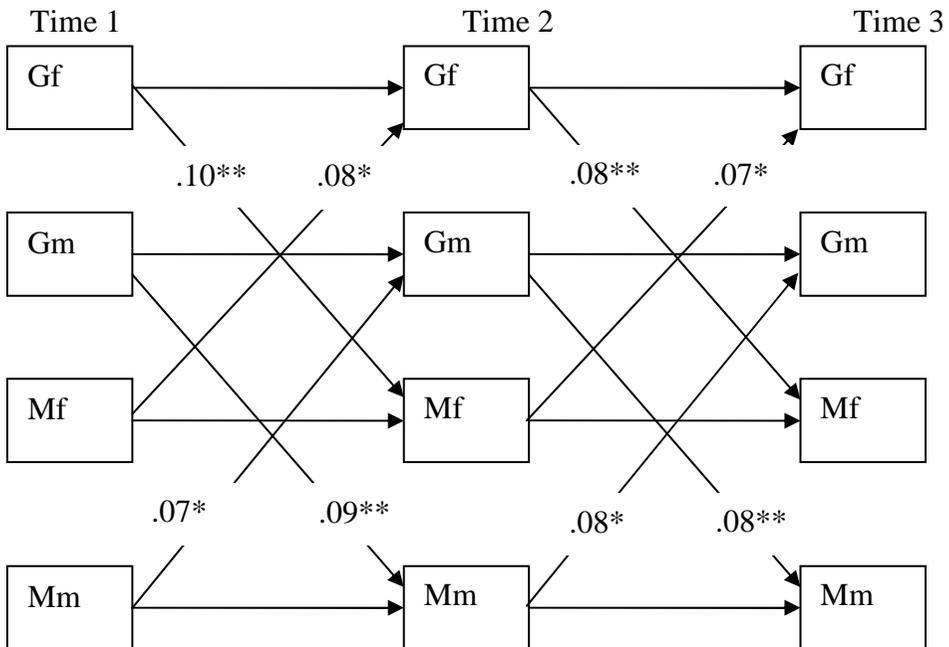


Figure 3. Cross-Lagged APIM-based analyses of Gratitude (G) and Relationship Maintenance (M), the subscript “f” indicates wives and “m” indicates husbands, including all Time 1, Time 2, and Time 3 cross-lagged within and between partner effects. Only significant effects are shown. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Taken together these results confirm that the intrapersonal pathways of the dual model of gratitude hold over time: Perceived partner responsiveness experienced at an earlier time point predicted gratitude at a later time point. In turn, gratitude experienced at an earlier time point predicted relationship maintenance behavior at a later time point. Moreover, although the reverse directional effects were also significant, our analyses showed that the effects of the predicted pathways were significantly stronger than those of the reverse pathways. Next, we tested Hy-

potheses 3 to 5. The analyses failed to yield the predicted interpersonal effects across all the time points.

### General Discussion

The present research provides a novel look at the role of gratitude in ongoing relationships and relationship maintenance. In line with previous research (Algoe et al., 2008), we found gratitude is a signal for perceived partner responsiveness and a motivator for relationship maintenance behaviors. Extending existing research, we found that this dual function applied to partners in ongoing relationships. Additionally, we showed that it had both interpersonal and interpersonal effects: Partner A's maintenance behavior is perceived by Partner B as a signal of Partner A's responsiveness to Partner B's needs. Moreover we found that gratitude functions as a detector of relationship maintenance, partly because Partner B perceives Partner A to be responsive to his or her needs. The dyadic model held at three time points separated by intervals of about one year. Thus, even four years into marriage the experience of gratitude not only motivates the self to maintain the relationship but these relationship maintenance behaviors are also noticed by the partner who perceives the self to be responsive to his or her needs, and in turn experiences gratitude. These findings suggest that the dual function of gratitude elicits a reciprocal cycle of benefits in relationships long beyond relationship formation.

Our results remained largely unchanged when controlling for relationship satisfaction and duration. These findings suggest that the relational effects of gratitude are not an artifact of general relationship satisfaction. Rather gratitude seems to be an other-praising emotion that is different from positive emotions and feelings such as happiness or satisfaction (Algoe & Haidt, 2009). Nevertheless, other variables should be considered to confirm the unique contribution of gratitude to the maintenance of ongoing, close relationships. To illustrate, future research should consider other potential indicators of maintenance, such as attribution biases (Bradbury & Fincham, 1990) or trait responsiveness to provide further evidence for the unique role of gratitude in relationship maintenance.

In addition, the intrapersonal pathways of the dyadic model of gratitude held longitudinally and were gender and time-invariant. Thus,

the benefits of gratitude are experienced equally by both wives and husbands and remain equally important even at later stages of marital relationships. As a result, contrary to previous suggestions in the literature (McCullough et al., 2008), our research demonstrates that gratitude benefits relationships beyond the initial reciprocal stages of development, thereby underlining the important role gratitude plays in the building and maintenance of relationships (Algoe & Haidt, 2009).

### **Theoretical Implications**

The present work provides important and novel, but preliminary, evidence for the benefits of gratitude in close relationship maintenance. At the same time it opens the door to the investigation of additional benefits of gratitude in close relationships. One interesting avenue for research is the interaction between the types of gratitude (benefit-triggered versus generalized) and relationships types (e.g., communal versus exchange). It is possible that benefit-triggered gratitude exerts stronger dyadic effects in exchange relationships, because partners keep careful track of each others' inputs into joint actions (Clark, 1984). Generalized gratitude may exert stronger dyadic effects in communal relationships, because partners consider each others' needs and are responsive to these needs, so that gratitude is about more than simple tit-for-tat. Alternatively, it is possible that benefit-triggered gratitude and generalized gratitude coexist in relationships, but that they shift in their importance as relationships develop. Benefit-triggered gratitude may be particularly important for relationship formation (Algoe et al., 2008; McCullough et al., 2008), while generalized gratitude may become more important as relationships progress.

Moreover, the effects of gratitude may vary across horizontal and vertical relationships. To illustrate, disclosure reciprocity is reliably found in horizontal relationships (e.g., romantic partners, siblings), but not in vertical relationships. Parents do not reciprocate the disclosure of their children (Finkenauer, Engels, Branje, & Meeus, 2004). Possibly gratitude and its intra- and interpersonal effects show similar asymmetries in vertical relationships.

Based on the interpersonal function of gratitude, both the experience and the expression of gratitude are important for relationship partners. Our research emphasizes the importance of experiencing gratitude

in close relationships, but did not examine the expression of gratitude in close relationships. Recent research by Lambert and colleagues (Lambert, Clark, Durtschi, Fincham, & Graham, 2010) suggests that expressing gratitude serves to strengthen the communal bond between partners. Thus, somehow paradoxically, the expression of gratitude may operate as relationships' currency which serves to acknowledge and repay partners' benefits and appreciation for each other.

Our research highlights the positive effects of the dyadic experience of gratitude in that both partners are grateful for each other, and both act to maintain the relationship. However, it is possible that gratitude may potentially have aversive effects for the self, and the relationship. Applying the currency metaphor to gratitude, one can wonder what happens if one of the partners is 'underpaid' or 'overpaid' by the other. An illustration of one such scenario comes from the work of Arie Hochschild (1989; in Fields, Copp, & Kleinman, 2006) who investigated two-career marriages. Hochschild (1989) discusses marital conflicts stemming from feelings of not receiving enough gratitude from the spouse. To illustrate, consider a marriage in which a husband contributes to the household chores, by making the beds or washing the dishes. The husband can see this behavior a worthy contribution, especially if he compares himself to his father and grandfather, who did not contribute to household chores at all. The wife, on the other hand, still has to do the remaining household chores in addition to working eight hours per day as an office clerk. Given all the work she does, the wife feels that, relative to her own effort, her husband's contribution to the household chores is too small to merit gratitude. As a result, both partners might not feel appreciated enough for something that each of them considers as important work for their relationship. A reverse situation, in which a partner is grateful for an undeserving behavior could also be negative for the self or the relationship. Indirect evidence for this suggestion comes from work by Luchies and colleagues (Luchies, Finkel, McNulty, & Kumashiro, 2010) who demonstrated that forgiveness can be harmful if people continue to forgive partners who are disrespectful toward the self. Thus, future research should consider the conditions under which gratitude might potentially be harmful the self or the relationships.

### **Strengths and Limitations**

Before closing, it is important to note several strengths and limitations of the present work. Although our study was longitudinal, a first limitation of the present research centers on the fact that we employed correlational data. Consequently, we cannot draw strong causal conclusions. In our longitudinal analyses we found that the relations between gratitude, perceived responsiveness, and maintenance behaviors were bidirectional, indicating that these variables mutually reinforce each other. Nevertheless, the links predicted by the dyadic model (i.e. the influence of prior perceived partner responsiveness on later gratitude, and the influence of prior gratitude on later maintenance behavior), were significantly stronger than the links in the opposite direction. Thus, the present research provides novel and preliminary evidence for causal paths proposed by the dyadic model. Experimental research should examine the causal links between perceived partner responsiveness, gratitude, and relationship maintenance suggested in our model.

Finally, although the interpersonal pathways emerged cross-sectionally, we failed to find them longitudinally. It is possible that the time interval between the data collections was too long. Our model required participants to remember their partner's maintenance behaviors in a particular week almost one year previously, which might be too long to predict responsiveness or gratitude one year later. In line with this suggestion, research shows that relationship maintenance is linked to relationship satisfaction when assessed contemporaneously but fails to predict satisfaction over time (e.g., Canary et al. 2002; Ogolsky, 2009). It is also possible that the lack of interpersonal effects is due to the types of measurement we used to assess maintenance and gratitude. Maintenance was measured at a specific level while gratitude was measure at a general level. Thus, future research should employ more general maintenance behavior ratings to test their relation to generalized gratitude over time.

But at the same time, our results are noteworthy in that they rest on data obtained from both partners in ongoing relationships. To our knowledge the present research is the first to investigate gratitude in the context of marital relationships. Our sample of couples was considerable and we observed consistent patterns of results across three data collections in tests of our key hypotheses. Our findings thereby promote confidence in our findings regarding the dual function of gratitude for rela-

tionship maintenance. As hypothesized by the dyadic model, the experience of gratitude seems to build a reciprocal system of positive behavior, where partners' positive acts mutually reinforce each other. Our model is consistent with other models showing that partners behaviors, feelings, and cognitions form a sustainable cycle of relationship functioning (e.g., Mutual Cyclical Growth Model; Wieselquist et al., 1991). Although our study focused on maintenance behaviors, it is likely that gratitude motivates other pro-relationship behaviors. For instance, one can imagine that gratitude may also influence accommodation (Finkel & Campbell, 2001), forgiveness (Fincham, Beach, & Davila, 2004), and sacrifice (Van Lange, Rusbult, et al. 1997). Such possible interactions with other pro-relationship behaviors would be in line with our suggestion that gratitude, in particular generalized gratitude, is more than a simple exchange of benefits (Algoe & Haidt, 2009). It motivates people to respond to each other's needs in a noncontingent, need-based fashion which makes generalized gratitude particularly functional in close relationships.

### **Concluding Remarks**

The present work offers an important contribution to recent research on the dual function of gratitude in social contexts. We have demonstrated that the experience of gratitude is an important part of a relationship maintenance system, in that it functions as a detector and a motivator for relationship maintenance behavior. Specifically, gratitude emerges as a response to the detection of close partners' maintenance behavior and responsiveness. Moreover, gratitude motivates partners to engage in maintenance behavior. Importantly, these signaling and motivating functions of gratitude have dyadic effects as they occur both within individuals and across partners in close relationships. Thus, we show that, in line with Proust's quotation, being grateful to the ones we love benefits ourselves as well as our relationships with our loved ones.



**Chapter 5**

**General Discussion**

The underlying theme of the present dissertation is the interplay between individuals' emotional states and social relationships. Throughout the current work I examined the influence of emotional states on interpersonal judgments and relationships in the context of initial interactions with strangers as well as intimate partners in marital interactions. This concluding chapter offers a summary of the findings and a discussion of their broad implications.

### **Overview of the Findings**

#### **Chapter 2**

Chapter 2 focused on the question of how change in similarity affects attraction and perceptions of trustworthiness. Thus, together with my co-authors, I examined similarity-attraction effect (e.g., Byrne, 1971) in a dynamic context where an individual is offered consistent or changing information about a target over the course of time. We found that a change toward dissimilarity, where new information shows less similarity than the old information, resulted in a decreased attraction and trust to the target person. Conversely, we found that a change toward similarity, where new information shows more similarity than the old information, resulted in increased attraction and trust to the target person. Moreover, by utilizing a modified version of a signal detection task, we found that individuals' memory was biased. More specifically, similarity information resulted in individuals' seeing similarities even where there were none, and dissimilarity information resulted in individuals' seeing dissimilarities even where there were none. Importantly, we tested one possible mechanism by which change in similarity affects attraction - via its impact on perceived partner trustworthiness. Namely, we found that similarity is attractive partly because it creates the feeling of trust, so that a similar other seems more trustworthy than a dissimilar other. These findings suggest that an increase in similarity leads to an increase in attraction partly because similarity communicates trustworthiness, whereas a decrease in similarity leads to a decrease in attraction partly because dissimilarity communicates untrustworthiness.

#### **Chapter 3**

The similarity-attraction phenomenon was further explored in Chapter 3, where it served as the context for investigating the effects of anxiety. The chapter focused on the question of how anxiety moderates the similarity-attraction phenomenon. Five studies found converging evidence that anxiety reduces people's tendency to prefer others who are similar rather than dissimilar to self. While low-anxious participants consistently favored similar over dissimilar others, high-anxious participants

liked similar and dissimilar others to an equal degree. The moderation of the similarity-attraction phenomenon emerged for both spontaneously occurring variations in state anxiety and manipulated anxiety. Moreover, the effect was solely attributable to state anxiety: neither trait anxiety nor other mood states (e.g., depression or anger), nor individual differences in attachment anxiety could account for our findings. We propose that the similarity-attraction effect is driven by an intuitive process of self-compatibility checking, whereby an individual's choice for similar others is made on the basis of accessing implicit preferences, and aligning them with the explicit attraction for similar others.

In line with the argument that anxiety disrupts one's access to intuition and blocks the process of self-compatibility checking, both low- and high-anxious participants displayed an implicit preference for similar over dissimilar others, as assessed by an evaluative priming task (Fazio, 2001). Moreover, mindfulness meditation and a global focus manipulation, which both facilitate reliance on intuitive, holistic processing, led to stronger similarity-attraction effects. In contrast, explanatory introspection, which facilitates reliance on a narrower processing style (e.g., Wilson, 2005), led to the same effects as anxiety. Specifically, low-anxious individuals exposed to explanatory introspection exhibited the absence of the similarity-attraction effect. Taken together, the findings of Chapter 3 offer preliminary evidence suggesting that similarity-attraction phenomenon relies, at least in the context of initial interaction, on intuitive processes. At the same time, the findings of Chapter 3 suggest that anxiety can disrupt the self-compatibility checking process thus extending previous research in this area (e.g., Baumann & Kuhl, 2003).

### Chapter 4

Extending the context of initial interaction, Chapter 4 investigated the functions of gratitude in established relationships, namely in interactions between spouses. We demonstrated that the experience of gratitude is an important part of relationship maintenance. We propose that gratitude serves a dual function in close relationships' functioning: it detects and facilitates relationship maintenance behaviour. Specifically, our studies showed that gratitude emerges as a response to the detection of close partners' maintenance behaviour and responsiveness. Moreover, it moti-

vates relationship maintenance behaviours. Importantly, gratitude functions on a dyadic level – it not only detects and motivates relationship maintenance behaviours on an individual level, but it also exerts its influence for both partners in a dyad. Chapter 4 also explored the benefits of gratitude in detecting and promoting relationship maintenance over time. We found that perceiving partner responsiveness predicted gratitude toward one's partner over time, and that this experience of gratitude promoted relationship maintenance over time. Importantly, our results were gender and time-invariant, and held when controlling for relationship satisfaction. This highlights the benefits of gratitude for close relationships by showing that the benefits of gratitude are experienced equally: a) by both wives and husbands, b) at different points of time throughout the relationship, and c) by couples with differing levels of relationship satisfaction. Thus, our research provides novel insights into the reciprocal nature of gratitude as a motivator and detector of relationship maintenance, showing that it benefits close relationships, thus exerting influence long beyond relationship formation.

### **Implications and Avenues for Future Research**

The chapters included in the dissertation employ a multi-method approach. Thus, the present work includes a diverse range of both experimental (Chapters 2 and 3) and non-experimental designs (Chapter 4), as well as a variety of statistical methods in order to test the advanced hypotheses. In addition, our hypotheses were tested on student samples (Chapters 2 and 3) as well as community samples within the Dutch society. The present dissertation offers a novel look at the interplay of emotional states and relationship contexts by considering a diverse range of emotional experiences, such as attraction, anxiety, and gratitude; and initial and established relationships. At the same time, the present work opens the door to new and exciting future research.

### **Similarity in Building Initial Attraction: The Role of Trust**

Our work highlights the importance of trust in promoting attraction during the initial stages of a relationship. We propose that during initial interactions, change in similarity is diagnostic, and consequential, for developing feelings of trust between partners. Partners who change toward dissimilarity are perceived as untrustworthy, which in turn causes reduced attraction; partners who change toward similarity are perceived

as trustworthy, which in turn causes enhanced attraction. The proposed importance of trust is supported by past research showing that trust is a core feature of relationships (Cottrell et al., 2007), that it is essential for reciprocity of attraction (Montoya & Insko, 2008), and that it embodies the perception that a partner is reliable, predictable, and responsive to one's needs (Holmes & Rempel, 1989). Our research suggests that similarity carries a symbolic meaning: sharing particular characteristics with the other makes that person 'safer' and thus more attractive.

Thus, our findings suggest that similarity plays a role in a system of safety-assessment of relationship formation. To be sure, the feeling of safety is important for building relationships, because relationships involve a certain degree of interdependence: Partners' outcomes depend on each others' preferences and behaviours (e.g., Kelley et al. 2003). As a consequence of this interdependence, in situations of conflicting interests, partners need to trust each other to be able to make compromises and sacrifices, rather than pursuing self-interests (van Lange et al., 1997). Thus, partners develop a way to gauge each others' responsiveness and optimize the assurance that a partner has regard for the self. As a consequence of the assessment of risk the partner poses for the self, individuals can decide whether to increase or maintain their dependence on their partners (if the risk is low) or whether to increase independence from their partners (if the risk is high) (Murray, Holmes, & Collins, 2007).

Also, evaluating a potential relational risk can have significant consequences for the self's functioning, as reflected by individuals' self-esteem. For example, according to the sociometer theory (Leary & Baumeister, 2000; Leary & Downs, 1995), self-esteem is part of a 'sociometer' which monitors one's social environment for cues of acceptance and devaluation by other people (e.g., lack of interest or disapproval). A possible implication of the fact that similarity is a signal of others' trustworthiness, is that a preference for similar others could be another example of the sociometer-like system. Namely, a preference for similar others could help to ensure that one is surrounded by those who will accept the self. Future research is needed to investigate these new and exciting possibilities of how similarity affects individuals' functioning through its effects on trust.

Moreover, as mentioned before, similarity's role in the risk assessment system of a potential partner can have crucial implications for the building of real-life relationships. To illustrate, Norton and colleagues (Norton, Frost, & Ariely, 2007) examined how perceptions of online dating partners differ prior to and after a meeting in a real-life setting. Interestingly, the authors found that prior to a meeting people tend to overestimate their similarity to their dates, and thus anticipate being attracted to that person in real life. However, during the meeting individuals are likely to discover more dissimilarity than expected, and the resulting feeling of dissimilarity leads to a significant decrease in the attraction to the date. Our research suggests that the decrease in attraction is partly triggered by the fact that the dissimilarity creates the feeling of not being able to trust the other. Given that the present research was conducted in a laboratory context, more research is needed to disentangle underlying processes of the formation of attraction and trust toward similar and dissimilar others in real-life settings.

### **The Influence of Anxiety on Initial Interpersonal Interactions**

In exploring the influence of anxiety on initial interpersonal evaluations, our work offers preliminary evidence that people's introspective access to their intuition may be blocked by feelings of anxiety or threat (Kuhl, 2000; Kazén et al., 2003). As a result, high-anxious individuals may be less capable of making evaluative differentiations between similar and dissimilar others, and thus, anxiety inhibits the similarity-attraction effect. The model of self-compatibility checking suggests that anxiety may lead to increased dissociations between implicit and explicit evaluations. Consistent with this suggestion, Chapter 3 showed that anxiety inhibited the similarity-attraction effect in participants' explicit evaluations, but not in their implicit evaluations. Anxiety, thus, leads to dissociation between implicit and explicit partner evaluations. More specifically, the experience of anxiety causes individuals to explicitly report equal liking for similar and dissimilar others, while implicitly favouring similar over dissimilar others.

The effect of anxiety helps to understand the cognitive mechanism underlying the similarity-attraction effect. Specifically, we propose that the similarity-attraction effect is based on an intuitive process, involving self-compatibility checking. This process rests on individuals'

ability to holistically assess the self and the other, and access the self's implicit preferences in making a judgement. According to the literature (Baumann & Kuhl, 2002), the access to the self's implicit preferences, and thus one's intuition can be disrupted by the interference of negative, self-threatening affect. Our studies support the view that anxiety could be one of such negative affects, because we found that anxiety impaired people's introspective access to their intuitive preferences. This lack of access to one's preferences can also take place for low-anxious individuals. Namely, the low-anxious individuals may lose their explicit preference for similar over dissimilar others when they are asked to verbalize their reasons for their evaluation. This finding fits well with prior observations that verbalizing reasons or explanatory introspection may impair access to intuitive preferences (Wilson et al., 1989). Moreover, the present research shows that a purely cognitive process may lead people to favour similar and dissimilar others to an equal degree.

Extant research often focuses on the effects, which personality factors such as trait anxiety (e.g., Coughlin, Huston, & Houts, 2000) or attachment anxiety (e.g., Simpson, Campbell, & Weisberg, 2006) have on close relationship functioning. In contrast to this, our research emphasizes the role of state anxiety, that is, the temporary experience of anxiety, has on relationship formation. Thus, our findings suggest that people's evaluation of similar and dissimilar others are subject to the influence of a current, intense emotional experience of anxiety. An interesting question for future research is how individuals evaluate and react to similar and dissimilar others once the anxiety is gone. One possibility would be that they reassess others, and thus distance themselves from the dissimilar others. Such a possibility is also supported by the findings of Chapter 2 of the present thesis, where individuals were able to re-evaluate others based on new similarity information. Another possibility would be that the relationships continue beyond the experience of anxiety. For instance, if the influence of anxiety takes place when one invests in a relationship, then a certain level of commitment might be formed, which could carry even sub-optimal relationships past the experience of anxiety (cf. Rusbult & Martz, 1995). According to the latter scenario, temporary anxiety could have long-term effects for one's relational life. Thus the

present work should inspire exciting new avenues for research on the long-term relational effects of state anxiety.

### **The Dual Function of Gratitude in Close Relationships**

An important contribution to the literature comes from our research on gratitude, reported in Chapter 4 of the present dissertation. Extant literature offers ample evidence for the intra-personal benefits of gratitude (e.g., Thrash, Elliott, Maruskin, & Cassidy, 2010; McCullough, Tsang, & Emmons, 2004) as well as the inter-personal benefits of gratitude in interaction with previously unknown others (e.g., Bartlett & DeSteno, 2006; Dunn & Schweitzer, 2005; for a review see: McCullough et al., 2008). The present research extends our understanding of the importance of gratitude by shedding light on its function in *ongoing* close relationships. We show that gratitude motivates the maintenance of already established relationships, specifically of marital relationships. Moreover, it provides evidence for the signalling function of gratitude by showing that gratitude is a reaction to the self's perception that the partner considers the self's needs over time.

Confirming the dual function of gratitude in close relationships, gratitude also serves as a motivator of maintenance behaviour. More importantly, we show that the benefits of the experience of gratitude for one's partner extend over time. Thereby gratitude is not only a positive emotional state but has important consequences for the relationship in that it motivates the self to engage in work for the good of the relationship as it progresses. Our findings provide preliminary evidence that the experience of gratitude in close relationships builds a reciprocal system of positive behaviour, where partners' positive acts mutually reinforce each other. As such, our findings are in line with the close relationships literature, which shows that partners' behaviours, feelings, and cognitions form a sustainable cycle of relationship functioning (e.g., Mutual Cyclical Growth Model; Wieselquist et al., 1991).

To be sure, the experience of gratitude in close relationship is a recent topic in the literature on gratitude. As a result the conditions on which gratitude operates in close relationships deserve more investigation. For instance, the question of what triggers gratitude in close partners could potentially provide new and exciting scientific. The present work is in line with the findings of Algoe and colleagues (Algoe, Haidt,

& Gable, 2008) showing that perceived partner responsiveness is important in gratitude's role in relationship formation and maintenance. Thus, the present literature provides preliminary evidence that relationship partners need to feel that the other did something which benefitted their specific needs and desires.

The expression of gratitude in close relationship offers interesting research possibilities. Clark and Mills (1979) propose that expressing emotions in communal relationships serves an important role, in that it communicates individuals' needs. At the same time, in contrast to exchange relationships, communal relationships are characterized by the fact that partners do not expect benefits in return for benefits already received (Clark & Mills, 1979). Thus, why would gratitude be expressed by partners in communal relationships? Recent research by Lambert and colleagues (Lambert, Clark, Durtschi, Fincham, & Graham, 2010) suggests that expressing gratitude serves the purpose of strengthening of the communal bond between partners. Thus, somehow paradoxically, gratitude may operate as the currency in which partners' benefits for each other are being repaid. In this sense, gratitude may well play a crucial role in strengthening relationships. More research on gratitude could shed more light on how partners in relationships deal with neutral or positive events in order to make their relationships stronger. Analogically, a similar function has been ascribed to capitalization. Specifically, telling one's partner about positive events in one's life has been shown to increase relationship well-being (e.g., Gable, Reis, Impett, & Asher, 2004). Future research should further illuminate the effects of gratitude and the expression of gratitude in making close relationships stronger.

### **Concluding Remarks**

All in all, the studies included in the present dissertation show that the interaction between emotional states and relationships is bi-directional. Namely, the experience of emotional states changes the way people approach potential and established relationship partners while the relationship context, in turn, changes individuals' experiences. Thus, on the one hand, emotional states exert influence on individuals' relational environments. For instance, experiencing anxiety (versus neutral emotional states) alters the evaluations of similar and dissimilar others. In a similar fashion, the experience of gratitude affects one's relationship by

motivating the self to engage in relationship maintenance behaviour. On the other hand, relational factors also influence individuals' experiences of emotional states. For instance, a partner's engagement in relationship maintenance behaviour is detected by the self and 'rewarded' with the appreciation of gratitude. Thus, emotional states and relationships are bound to go together. Interestingly, an internet search for the term 'rules of attraction' generates over 200 million hits, clearly this is an issue that people are thinking about. Hopefully, the present dissertation offers new ideas and inspires new questions on how trust, anxiety and gratitude can shape the 'rules of attraction' in its initial and more relationship-relevant stages.

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De voorliggende dissertatie doet onderzoek naar de invloed van emotionele toestanden op sociale relaties. Mijn coauteurs en ik onderzochten hierin fenomenen als vertrouwen, angstige bezorgdheid en dankbaarheid. Bovendien keken we naar de invloed die emotionele toestanden kunnen hebben op verschillende soorten inter-persoonlijke processen: van aanvankelijke interacties met onbekende anderen tot interacties tussen echtgenoten.

Het eerste empirische hoofdstuk van de dissertatie, hoofdstuk 2, onderzocht het klassieke similarity-attraction – of soort zoekt soort – effect (Byrne, 1972), waarin mensen zich meer tot elkaar aangetrokken voelen naarmate ze meer gelijkenissen vertonen. We onderzochten de aantrekkingskracht van gelijken in een dynamische context van veranderende informatie, waarin nieuwe informatie meer of juist minder overeenkomsten kan suggereren dan oude informatie. We vonden dat een verandering in de richting van ongelijkheid, waarbij nieuwe informatie dus minder overeenkomsten liet zien dan de oude informatie, ertoe leidde dat een doelpersoon minder aantrekkelijk werd bevonden en minder werd vertrouwd (en vice versa). We vonden ook dat gelijkheid een meer symbolische betekenis kan hebben, dat wil zeggen: het communiceert vertrouwen. De aantrekkingskracht van gelijke anderen ligt dus gedeeltelijk in het vertrouwen dat ze wekken.

Hoofdstuk drie ging verder met de exploratie van het similarity-attraction effect door te kijken naar de cognitieve basis daarvan, en naar de vraag hoe angstige bezorgdheid dit effect kan modereren. Vijf studies leverden bewijs dat angstige bezorgdheid het similarity-attraction effect elimineert: deelnemers met een hoge angstige bezorgdheid hadden dezelfde mate van voorkeur voor gelijke of ongelijke anderen, terwijl deelnemers die laag scoorden op angstige bezorgdheid de voorkeur gaven aan gelijke anderen (in lijn met de klassieke bevindingen). Hoewel hoogangstig bezorgde mensen op correcte wijze overeenkomstigheid signaleren, en dezelfde mate van voorkeur aan de dag leggen voor gelijke anderen als laagangstig bezorgde mensen, hebben de eersten dus geen voorkeur voor gelijke anderen op expliciet niveau. Hoofdstuk drie biedt een verklaring voor dit effect van angstige bezorgdheid: wij suggereren dat het similarity-attraction effect wordt aangejaagd door een intuïtief proces. Angstige bezorgdheid verstoort dit proces, door de evaluaties die mensen maken los te koppelen van hun intuïties.

Buiten de context van aanvankelijke interacties met onbekenden, richtte hoofdstuk vier zich op bestaande echtelijke relaties. Meer in het bijzonder, hoofdstuk vier keek naar het belang van dankbaarheid in het relatieonderhoud. Wij suggereren dat dankbaarheid in nabije relaties een dubbele functie heeft, die bestaat uit zowel het ontdekken als het motive-

ren van gedrag dat het relatieonderhoud dient. Van belang is dat we konden aantonen dat dankbaarheid op dyadisch niveau functioneert: het zorgt niet alleen voor zelfmotivatie om aan de relatie te werken, maar maakt ook dat de partner hetzelfde doet. Sterker nog, onze studies lieten zien dat dankbaarheid tevens het relatieonderhoud op de lange termijn ondersteunt, onafhankelijk van sekse, relatietevredenheid of relatieduur. In onze studies had dankbaarheid dus hetzelfde effect op mannen en vrouwen, gelukkige en minder gelukkige huwelijken en huwelijken met een kortere evenals een langere voorgeschiedenis.

Deze dissertatie omvatte een variëteit aan zowel experimentele (hoofdstuk twee en drie) als niet-experimentele onderzoeksdesigns (hoofdstuk vier). Het zet de deur open naar opwindend nieuw onderzoek. Er is bijvoorbeeld meer onderzoek nodig om te zien of nieuwe informatie over gelijkheid dan wel ongelijkheid de beoordeling van bekende anderen kan veranderen; of hoe de ervaring en expressie van dankbaarheid het functioneren van de relatie kan beïnvloeden. Samengevat hebben we in de loop van het werk onderzocht hoe emotionele toestanden tot interpersoonlijke aantrekking kunnen leiden, zowel in potentie tot relaties, als hoe ze kunnen helpen bij het onderhoud van reeds gevormde relaties.

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Katarzyna Ewa Kubacka (more often known as Kaśka) was born on December 14, 1982 in Słupsk, Poland. Interestingly, the seemingly quiet city became the stage of violent protest after an accidental death by a policeman of a teenage football supporter in 1998. This event not only put the city in the spotlight of media's attention (including an article in LA Times, available online), but also disrupted Kaśka's daily routines for about a week. Perhaps because of a frustration which followed this disruption, or perhaps because of innate restlessness, Kaśka decided to move to Gdynia, to pursue International Baccalaureate Program, in 1999. This two-year high school program brought two of her best friends for life, a perhaps permanent dislike for 'The Great Gatsby', and an even stronger need to move further. As a result, in the company of her two friends, Kaśka moved to Bremen, Germany, in 2001. There she started an undergraduate program in Intergrated Social Sciences, to which she soon added another major, in Integrated Social and Cognitive Psychology. Nearing the completion of her studies at the International University Bremen (now known as Jacobs University Bremen), it became clear that psychology interested her more than any other social sciences she had studied. To her delight, the Vrije Universiteit Bremen was about to start a seemingly fascinating Research Master program, and so Amsterdam became Kaśka's new home in the late summer of 2004. During the course of the Master's among the many interesting subjects and research areas, which she was able to immerse herself in, relationship research stood out as the most fascinating discipline. Driven by her fascination with interpersonal relationships, and encouraged by the wonderful supervision by Caryl Rusbult and Catrin Finkenauer, Kaśka completed two lines of research upon her graduation from the Research Master in July, 2006. The projects happened to deal with ideal and actual similarity, and became the starting points of her PhD from August 2006 till the completion of this book. Apart from research Kaśka spent the last four year pursuing her interests in music (making use of Amsterdam's wonderful concert listings) and film (volunteering for film festivals) and travel (aided by presenting at conference in the US, Israel or Sweden).



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