

**Doing good does you good:  
Prosocial behavior as a  
sexual and social signal**

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## 1 Introduction

*“No man is an island, entire of itself;  
every man is a piece of the continent, a part of the main”*

John Donne

English clergyman and poet (1572 - 1631)

Since the dawn of evolutionary theory (Darwin, 1859, 1871), scholars have been applying the laws of natural selection to research on physiological structures. Since this time, it has been suggested that the defining features of a species, such as a turtle’s resilient shell or a pigeon’s inner compass, result from undirected evolution rather than purposeful creation. However, many scholars have been reluctant to apply the laws of natural selection to humans, particularly human minds. Thus, the study of the human mind long remained within the domain of psychologists, philosophers, and theologians.

However, since the second half of the 20<sup>th</sup> century, with the advent of *ethology* (Lorenz, 1965; Tinbergen, 1951), evolutionary theory has slowly been conquering the realm of psychology, and scholars now consider that animal and human traits, emotions, cognitions, and behaviors result from variation, inheritance, and selection (Brown, 1991; Harlow, 1971; Seligman, & Hager, 1972; Wilson, 1975). This recent consideration also implies a shift of perspective from proximate explanations (*how*, i.e., the causal mechanisms) to ultimate explanations (*why*, i.e., the fitness consequences) of behavior (Tinbergen, 1963).

Many traits, emotions, cognitions, and behaviors have been consistently explained and predicted using the laws of natural selection. However, there is one last secure stronghold, withstanding many evolutionary explanations: human prosociality (West, El Mouden, & Gardner, 2011). Charles Darwin was astonished by frequent display of virtue and bravery in humans, and he struggled to fathom morality in terms of natural selection (Darwin, 1871). Why do people perform good deeds? Why do people take costs and run risks to bestow benefits upon others?

In the following sections, I will provide a short account of two classic evolutionary explanations of human prosociality, altruism, and cooperation, particularly with regard to the shortcomings concerning the explanatory power of these principles for many real-life instances of human prosociality. As an extension and alternative, I will introduce the idea of biological markets (Noë, & Hammerstein, 1994, 1995) and suggest how prosociality can be explained as a result of signaling mechanisms. I will conclude this chapter with a discussion of some theoretical considerations underlying my research and provide an overview of the following empirical work.

### **1.1 Classic evolutionary explanations of human prosociality**

In this chapter, I will use the terms altruism, cooperation, and prosociality interchangeably to describe the costly behaviors of a sender, which grant immediate benefits to a receiver. West, Griffin, and Gardner (2007, p. 662) define altruism as “a behavior that is costly to the actor and beneficial to the recipient” and further clarify that “cost and benefit are defined on the basis of the lifetime direct fitness consequences of a behavior”. Direct fitness is defined as “the component of fitness gained from producing offspring; [i.e.,] the component of personal fitness due to one’s own behavior” (p. 662).

Natural selection operates on differences in *reproductive fitness* (i.e., relative reproductive success). Over the course of time, selection favors traits that increase fitness and eliminates traits that decrease fitness. Altruistic behavior reduces the fitness of the sender and increases the fitness of the receiver; therefore, this behavior should be ruled out by natural selection (Trivers, 1971).

One explanation for the evolution of altruism is Hamilton’s (1964) theory of *inclusive fitness*. Inclusive fitness transcends Darwin’s (1859) concept of classical fitness by accounting for the effect of an individual’s actions not only on personal reproductive success, but also on the reproductive success of genetic relatives. Because genetic relatives share copies of genes (with the probability of gene sharing determined by the

degree of genetic relatedness), helping one's kin might increase one's inclusive fitness. The closer one is related to the recipient, the more one should be inclined to help. While classical fitness considers the perspective of a single individual, inclusive fitness reflects the perspective of a single gene (Dawkins, 1989; Hamilton, 1964; Williams, 1966). From the perspective of a single gene, it does not matter whether copies reside within one organism or another, as long as these genes are successfully passed on to future generations. Although inclusive fitness theory can be considered the single most important recent addition to the theory of natural selection (Buss, 2012), the explanatory power of this principle, regarding human altruism, is limited to a comparatively narrow range of helping behaviors, namely help among genetic relatives. However, in real-life, altruism is not confined to help among kin. People frequently bear costs to help individuals who are not relatives.

Altruistic behavior among non-kin can be explained by the theory of *reciprocal altruism* (Trivers, 1971). Reciprocal altruism occurs when individuals cooperate for mutual benefit (Cosmides, & Tooby, 1992), i.e., when benefits bestowed upon non-relatives are reciprocated in the future. The beauty of reciprocal altruism is that individuals help in times of abundance and receive aid in times of need. Thus, the benefits exceed the respective costs of helping (Trivers, 1971). However, reciprocal altruism only occurs within social relationships that allow for repeated interactions (Axelrod, & Hamilton, 1981). Similarly, according to the principle of reciprocal altruism, those whom we help must be both able and willing to reciprocate in the future. Human prosocial behavior frequently violates these premises. For example, people often give change to beggars who they rarely encounter again and who they do not expect to reciprocate anything at any given time.

How can evolutionary theories explain prosocial behavior that violates the premises of the inclusive fitness theory and the theory of reciprocal altruism? The basic idea underlying this thesis is that good deeds might evoke future benefits by signaling the qualities of an individual to

third parties, ultimately increasing his or her value as a partner in a biological market.

## 1.2 Biological markets

Humans populate *biological markets*. In a biological market, individuals compete for access to relationships with valuable partners who provide benefits relevant to reproductive fitness (Barclay, 2013; Noë, & Hammerstein, 1994, 1995). A particular subset of a biological market is the mating market, where men compete for sexual access to desirable women, and women compete for access to desirable men. The most desirable women mate with the most desirable men and successfully reproduce, whereas less desirable individuals must stick with other less desirable individuals or perish. However, mating is not the only domain governed by the laws of biological markets. In a biological market in the broadest sense, many “commodities” are traded and many “currencies” exist, e.g., protection, sexual access, and coalitional aid. In other words, whenever individuals are free to choose whom to interact with and whom to shun, and whenever one’s own reproductive success is contingent upon the actions of others, biological markets emerge (Barclay, 2013). Individuals differ in traits that render them better or worse partners and thus determine their market value. To attract good partners, individuals must be considered good partners. However, this rationale does not imply that biological markets unite individuals possessing the same traits or looking for the same things. Rather, this idea implies that biological markets bring together individuals whose aggregated traits represent the same market value to each other (Barclay, 2013). A simple example from the mating market is that a very affluent but physically hideous man might succeed in attracting a very beautiful but desperately poor woman, and vice versa. As for any market, biological markets adhere to the laws of supply and demand.

A forerunner to the idea of biological markets is *indirect reciprocity theory* (Alexander, 1987; Nowak, & Sigmund, 1998, 2005). According to this theory, altruistic acts demonstrate the propensity of an individual

for doing good and contribute to the *reputation* of the focal individual as a benefactor. Third parties consider this reputation when identifying cooperation partners (Barclay, 2004). However, the concept of indirect reciprocity is much narrower than the concept of biological markets, as this principle implicitly states that cooperation will be rewarded with the future cooperation of third parties. In other words, cooperation is the only commodity in the model of indirect reciprocity, whereas in the model of biological markets, anything relevant to reproductive success can be a commodity, and the willingness and ability of an individual to provide these commodities determines their value as a partner (Barclay, 2013).

### 1.3 Signaling

I argue that the propensity of an individual to perform good deeds is a valuable asset in a biological market because it might increase the market value of the individual as both an intimate and cooperative partner.

However, before empirically extending this argument in Chapters 2 to 4, one must first consider that individuals must identify partners possessing a propensity to perform good deeds. *Signaling* might be a solution to this problem.

Just as the lavish and luminous plumage of the peacock signals superior health to peahens, good deeds might signal some underlying qualities of the individual, even (and arguably particularly) if these good deeds are directed towards third parties, i.e., if the observer of the signal does not directly benefit from the good deed. This idea has been formalized as the *handicap principle* or *costly signaling* (Gintis, Smith, & Bowles, 2001; Lotem, Fishman, & Stone, 2003; Zahavi, 1975, 1977, 1995; Zahavi, & Zahavi, 1996). Beyond signaling a good character to third parties (e.g., Barclay, 2004), altruistic and cooperative acts are assumed to reflect a wide range of underlying qualities, such as resource-holding potential, low mutation-load and even general intelligence (Miller, 2000, 2007; Millet, & Dewitte, 2007). Advocates of the

costly signaling theory suggest that a signal must be particularly costly and hard-to-fake to serve as an honest signal for the underlying trait, i.e., that only individuals possessing the trait can “afford” the signal (e.g., Lotem et al., 2003; Zahavi, 1977; Zahavi, & Zahavi, 1996).

However, if the object of study is limited to signals of morality, I argue that, in case of doubt, even small and minor deeds can be regarded as telltale signs of good or bad character, thereby affecting the market value of an individual. Even if selfish people might sometimes strategically fake signals of good character by doing good, the definition of selfishness requires that these instances will only occasionally occur. After all, if a selfish individual behaved selfless at all times (even if only for the purpose of falsely signaling selflessness), the individual could no longer be considered selfish. In short, as long as there is a higher probability of observing a good person performing a good deed than observing a bad person performing a good deed, these signals will affect trait inferences, particularly if other sources of acquiring information are limited. Indeed, as classic psychological research of the fundamental attribution error shows, humans attribute the isolated actions of others to the character of the individual rather than situational factors (Ross, 1977). Heuristics such as these would likely not have evolved if they did not often lead to valid inferences (Gigerenzer, & Todd, 1999; Harvey, Town, & Yarkin, 1981).

#### **1.4 Overview of the empirical research**

Together with Olga Stavrova, Julia Pradel, Thomas Schlösser, and Detlef Fetchenhauer, I examined the effects of isolated acts of prosocial behavior as signals of good character across four studies. Two determinants of the market value of an individual were considered: desirability as a mate (Chapter 2 and Chapter 3) and desirability as a cooperative partner (Chapter 4). Specifically, we explored the *conditions* under which isolated prosocial acts lead to considerable gains in the desirability as a mate or cooperative partner and the conditions under which such acts fail to have an effect.

On the one hand, these conditions might reflect the structure of demand within specific subsets of biological markets (Chapters 2 and 3). According to sexual strategies theory (Buss, & Schmitt, 1993) and the theory of strategic pluralism (Gangestad, & Simpson, 2000), prosociality signals might differentially impact the market value of an individual as a short-term partner as compared to the market value as a long-term partner.

On the other hand, there might be ambiguity due to different interpretations regarding the traits underlying specific signals (Chapter 4). Depending on situational circumstances and the person of the observer, the same act might be construed in terms of different traits, e.g., morality and competence, leading to different representations of the market value of an individual as a cooperative partner.

Doing good has many facets. In the present research, however, we concentrated on three classes of prosocial behavior: altruism (Chapter 2), trustworthiness (Chapter 3), and trust (Chapter 4).

In Chapter 2, we explored how signals of altruism shape perceptions of desirability in the short-term and long-term mate choices of females. According to the theory of strategic pluralism (Gangestad, & Simpson, 2000), most women possess distinct mate preferences allowing them to identify short-term partners with good genes and long-term partners with adequate partner or parenting characteristics. We presented video clips of male targets possessing various levels of physical attractiveness and provided counterbalanced information on the behavior of the targets in a one-shot dictator game. Female raters evaluated the targets with regard to the desirability as either short-term sexual or long-term romantic partners. Signals of altruism were more relevant for long-term rather than in short-term mate choices, whereas preferences for physical attractiveness were equally pronounced in both contexts. In addition, we observed that in long-term mating, displays of altruism had a larger effect on the desirability of physically attractive rather than unattractive targets.

Chapter 3 extended the scope of our first study by accounting for both female and male preferences and further substantiating the interplay between signals of morality and physical attractiveness. Based on sexual strategies theory (Buss, & Schmitt, 1993) and a cognitive perspective of preferential mate choice (Miller, & Todd, 1998), we experimentally investigated the ways physical attractiveness and signals of moral virtue jointly shape perceptions of desirability in the long- and short-term mate choices of females and males. Silent video clips of target actors differing in physical attractiveness were presented to raters of the opposite sex who were provided with counterbalanced information regarding the decision of each target as a trustee in a one-shot binary trust game (previously validated as a suitable signal of moral virtue). The raters judged the desirability of the targets as either short-term sexual or long-term romantic partners. Physical attractiveness had a larger influence on desirability ratings in the short-term context, whereas moral virtue was more important in the long-term context. The preferences of males were more context-dependent, shifting more strongly towards physical attractiveness in the short-term context and moral virtue in the long-term context than the preferences of females. In the long-term context, physical attractiveness and moral virtue were mutually reinforced regarding their effects on perceptions of desirability.

In Chapter 4, we examined the influence of trustful behavior on the value of individuals as cooperation partners. In general, people prefer cooperation partners that possess both the willingness and the ability to cooperate (Fiske, Cuddy, & Glick, 2007). However, trust is a double-edged sword; depending on the situation, trustful behavior might be perceived as self-interested or other-regarding, smart or gullible. Across two studies, noninvolved observers inferred personality traits from trustful versus distrustful behaviors in the context of a one-shot binary trust game. Considering the effects of social projection and consequentialism, we observed that trustful behavior was almost universally perceived more favorably than distrustful behavior with regard to fundamental dimensions of social judgment, namely warmth and competence,

and with regard to overall evaluations of personality. These findings support the notion that displays of trust might serve as social signals, demonstrating the qualities of an individual as a cooperative partner.

A short integrative discussion of the empirical research presented in Chapters 2 to 4 is presented in Chapter 5, and future research is outlined in Chapter 6.

### **1.5 Coauthors' contributions**

Chapter 2 is based on a manuscript submitted to the *British Journal of Social Psychology* together with Julia Pradel, Olga Stavrova, and Detlef Fetchenhauer. Julia Pradel designed and conducted the study. Olga Stavrova assisted with the analysis and interpretation of the experimental data and the preparation of the manuscript, particularly regarding the results section. Detlef Fetchenhauer provided advice on the experimental design and preparation of the manuscript.

Chapter 3 is based on a manuscript submitted to *Personal Relationships* together with Olga Stavrova and Detlef Fetchenhauer. Olga Stavrova assisted in the analysis and interpretation of the experimental data and provided feedback on various drafts of the manuscript. Detlef Fetchenhauer provided advice regarding the design of the study and the preparation of the manuscript.

Chapter 4 is based on a manuscript prepared for submission to the *European Journal of Social Psychology* together with Thomas Schlösser, Olga Stavrova, and Detlef Fetchenhauer. Thomas Schlösser provided advice concerning the design of both studies. Olga Stavrova assisted with the analysis of the data and interpretation of the results. Detlef Fetchenhauer provided advice on the experimental design and preparation of the manuscript.

## **2 Sexy or kind? Preferences for male physical attractiveness and altruism in females' short-term and long-term mate choices**

### **2.1 Introduction**

Which traits do women seek in a man when they are looking for “Mr. Right”? In fairytales, “Mr. Right” is usually both handsome and virtuous, like Prince Phillip in “Sleeping Beauty”, who overcame a forest of thorns and defeated the wicked fairy to awake beautiful Aurora with a kiss. Unfortunately, men like Prince Phillip are few and far between. Yet, in real life, living happily ever after is not the only type of possible relationship. Thus, women might find a man as kind (but most likely not as handsome) as Prince Phillip for a committed long-term relationship, while still occasionally having sex with a man as handsome (but most likely not as kind) as Prince Phillip.

In the present study, we explore whether female preferences toward physical attractiveness and altruism are subject to strategic pluralism (Gangestad, & Simpson, 2000), i.e., whether female preferences for physical attractiveness are more relevant in short-term than in long-term mate choices, whereas preferences for altruism are more pronounced in long-term than in short-term mate choices. However, why may such a shift in preferences occur?

#### **2.1.1 The benefits of strategic pluralism**

The theory of parental investment (Trivers, 1972) postulates that women invest more time and effort into their offspring and should thus be choosier than men in regard to mate selection. Because women are more limited than men in their hypothetical maximum number of offspring, they typically cannot increase their reproductive success by having a large number of mates. Hence, women should place a high value on the *quality* (rather than the *quantity*) of their potential mates, both in terms of genetic endowment and in terms of qualities as a good partner or loving parent for future offspring. Still, a popular notion says that “you can’t always get what you want”, and very few women will be able

to attract a partner who is endowed with both good genes and good partner or parenting characteristics. According to the theory of strategic pluralism (Gangestad, & Simpson, 2000), women may consider obtaining these different qualities from different partners, i.e., looking for good genes in short-term sexual partners and looking for good parenting or partner characteristics in long-term mates. On the other hand, according to Gangestad and Simpson (2000), men should react to female preferences by specializing in one particular mating strategy: those endowed with superior genes (and thus appearance) could benefit from specializing in short-term mating. It has been shown that facial and bodily attractiveness in males is correlated with an increased number of short-term, but not long-term, sexual partners and with an earlier onset of sexual activity (Rhodes, Simmons, & Peters, 2005). Furthermore, Simpson and Gangestad (1991) showed that unrestricted sociosexuality in men is correlated negatively with markers of relationship quality, such as commitment to the current partner, investment in the ongoing relationship and love for and psychological and emotional dependency on the current partner. On the other hand, according to Gangestad and Simpson (2000), men who cannot signal their genetic qualities through physical attractiveness could compensate for this weakness by demonstrating their qualities as a good long-term partner or parent and should therefore specialize in long-term mating. Indeed, it has been shown that fluctuating asymmetry (with symmetry being a marker of good genes) is negatively correlated with lifetime number of sexual partners in males (Gangestad, & Thornhill, 1997) and that sexually restricted men tend to present themselves as “nice guys” in intrasexual competition, while unrestricted men are more likely to use direct competition tactics, such as asserting superiority over prospective rivals (Simpson, Gangestad, Christensen, & Leck, 1999).

### **2.1.2 Which traits do women desire in short-term and long-term partners?**

Temporal shifts in females' mate preferences rarely manifest in such a way that male traits that are desirable in long-term mating suddenly become undesirable in short-term mating, or vice versa. Rather, one can observe a considerable shift concerning the "necessities" versus "luxuries" regarding the most desirable traits in a long-term or short-term partner (Buss, & Schmitt, 1993; Li, Bailey, Kenrick, & Linsemeier, 2002; Li, & Kenrick, 2006; Regan, Levin, Sprecher, Christopher, & Cate, 2000). Short-term mating preferences should be especially tuned to finding a mate with good genes, while long-term mating preferences should be aimed at identifying a mate who would be a caring spouse or loving father to future offspring (Gangestad, & Simpson, 2000).

Attractive male physical features, such as facial and bodily symmetry or masculinity, are considered to be cues of good health and thus superior genetic quality (e.g., Gangestad, & Thornhill, 1997; Rhodes, 2006). Gangestad and Thornhill (1997) provided compelling evidence that women seek out physically attractive men, especially as short-term partners. This claim is backed by a growing body of research highlighting the influence of the female menstrual cycle (and thus fertility) on preferences for male physical attractiveness (e.g., Gangestad, & Thornhill, 2008; Gangestad, Thornhill, & Garver-Apgar, 2005). During estrus, i.e., when the probability of conception is the highest, women preferentially seek men who possess markers of good genes, such as symmetrical features and masculinity. In particular, women with less sexually attractive long-term partners exhibited a stronger desire for sex with attractive males outside their relationship around ovulation (Pillsworth, & Haselton, 2006).

A multitude of studies across several cultures have shown that many moral traits related to altruism, such as kindness, honesty or warmth, are universally said to be attractive in a mate (e.g., Barclay, 2010, Buss, 1989a; Phillips, Barnard, Ferguson, & Reader, 2008; Regan et al, 2000). Yet, identifying a *truly* altruistic man is not trivial because

seemingly altruistic behavior will often be nothing but mere mating efforts (e.g., invitations to dinner, flowers, or presents). Therefore, the scope of our research will be limited to altruism directed toward third parties (e.g., donations to charity or homeless persons) in which the woman does not benefit directly herself but might still draw inferences about a man's character.

To the best of our knowledge, until now, there have been very few studies aimed at the attractiveness of altruism directed at third parties considering differential preferences in short-term and long-term mating as predicted by the theory of strategic pluralism.

Barclay (2010) examined the desirability of altruism in short-term and long-term mate choices using simulated dating advertisements that contained pictures and short descriptions of target persons, which either indicated altruistic tendencies or were lacking such cues. For each sex, four different but equally attractive pictures were used and counterbalanced across the conditions. It became apparent that across both sexes, altruists were rated to be more desirable than neutrally described individuals for long-term relationships. For one-night stands, on the other hand, women did not significantly prefer altruists over neutrally described individuals, while men even preferred neutrally described women over altruistic women.

Furthermore, Farrelly (2011) investigated preferences for altruism in females' short-term and long-term mate choices in a series of four experiments. In three out of the four experiments, Farrelly employed written descriptions of target persons containing or not containing cues about altruistic character traits or altruistic behavior (similar to Barclay, 2010). In the fourth experiment, several specific actions related to altruism (e.g., regularly donating blood) were rated concerning their desirability in a short-term or long-term mate. Farrelly did not include any pictures or videos of the target persons. The results indicated that women tended to favor signs of altruism primarily in long-term relationships. Additionally, contrary to studies highlighting the influence of menstrual cycle stage on mate preferences for markers of good genes,

Farrelly did not find any noteworthy relationship between female cycle stage and preferences for altruism in males, indicating that altruism was likely not perceived as a signal of genetic quality.

Barclay (2010) and Farrelly (2011) provided information on prospective short-term or long-term partners' altruism by employing experimental vignettes containing fictionalized dating profiles, which allowed them to state that altruism was more important in long-term than in short-term mate choices. Although these findings are in line with the theory of strategic pluralism, the aforementioned studies can only confirm one part of Gangestad and Simpson's theory, namely, that women attach more importance to displays of altruism in long-term mating than they do in short-term mating. Likewise, it has been shown that women exhibit stronger preferences for markers of good genes in short-term than in long-term mate choice (e.g., Gangestad, & Thornhill, 1997), which provides support for the other part of the theory of strategic pluralism. Still, to the best of our knowledge, there have been no studies concurrently testing both parts of the theory until now. Thus, to obtain a more comprehensive and holistic perspective of strategic pluralism, we decided to examine the relevance of markers of good genes (i.e., physical attractiveness) *and* markers of good partner or parenting qualities (i.e., altruism) in short-term and long-term mate choices at the same time.

In summary, it can be stated that a multitude of studies have indicated that male physical attractiveness is a marker of good genes and should thus be particularly relevant in short-term mating (e.g., Gangestad, & Thornhill, 1997; Rhodes, 2006). Additionally, there is preliminary evidence suggesting that altruism should predominantly be a marker of good partner or parenting qualities and should thus be more important in long-term mating (Barclay, 2010; Farrelly, 2011). Thus, in accordance with the theory of strategic pluralism and existing empirical data, we have derived the following hypotheses:

*Hypothesis 1:* Women prefer physically attractive men over less physically attractive men.

*Hypothesis 2:* In females' short-term mate choices, preferences for physical attractiveness are more pronounced than in long-term choices.

*Hypothesis 3:* Women prefer altruistic men over egoistic men.

*Hypothesis 4:* In females' long-term mate choices, preferences for altruism are more pronounced than in short-term choices.

### **2.1.3 The current study**

To test these hypotheses, we devised a video-aided rating procedure that allowed us to simultaneously and independently manipulate information on both physical attractiveness and altruism.

Unlike Barclay (2010), who provided pictures of equally attractive individuals (possibly to render the dating advertisements more realistic and credible), and Farrelly (2011), who provided only written descriptions of target persons and no pictures or videos at all, we decided to present a broad sample of various men with substantially different levels of physical attractiveness in either short-term or long-term mating contexts.

Furthermore, instead of using fictionalized personality profiles containing rather mundane displays of altruism, such as volunteer work or donations to charity (Barclay, 2010; Farrelly, 2011), we decided to provide information on targets' decisions in a one-shot anonymous dictator game. In experimental psychology and economics, the dictator game, first employed by Kahneman, Knetsch and Thaler (1987), has been established as a standard procedure for measuring altruism (and egoism) on a behavioral level (e.g., Eckel, & Grossman, 1996; Forsythe, Horowitz, Savin, & Sefton, 1994; Hoffman, McCabe, & Smith, 1996). Endowed with a certain amount of money provided by the experimenter, the dictator has to decide how much of this endowment he or she wishes to pass on to an anonymous receiver in a one-shot interaction. The receiver is bound to accept the dictator's decision, which eliminates any strategic concern on the part of the dictator. Giving in dictator game experiments appears to be positively related to trait agreeableness in the Big-Five model and the honesty-humility dimension in the

HEXACO-model of personality (Ben-Ner, Kong, & Putterman, 2004; Ben-Ner, Kramer, & Levy, 2008; Ben-Ner, Putterman, Kong, & Magan, 2004; Hilbig, & Zettler, 2009). Likewise, generosity in the dictator game has been associated with the personality disposition of justice sensitivity. Specifically, people who are sensitive to observing that others are treated unfairly and people who are sensitive to profiting from unfair situations have been shown to allocate larger proportions of their initial endowments to receivers in the dictator game (Fetchenhauer, & Xu, 2004). Furthermore, Benz and Meier (2008) demonstrated in two experiments that charitable giving in experimental settings was positively correlated with charitable giving in field settings before and after the respective experiments. By providing information on targets' behavior in such a dictator game, we were thus able to systematically and authentically manipulate information on targets' altruism, yet avoid making up specific personality profiles, which may inadvertently differ in other dimensions than the one we intended to manipulate.

Providing counterbalanced information on physical attractiveness and on altruism allowed us to test multiple predictions concerning female preferences for attractiveness and for altruism in short-term and long-term mate choices at the same time.

## **2.2 Method**

### **2.2.1 Stimulus material and ratings of physical attractiveness**

A total of 77 male students from a large Dutch university were videotaped sitting in front of a white wall while introducing themselves. The videos were cut into silent 20-second clips with a ten-second transition in which the identification number of the upcoming video was displayed. On the basis of these clips, 25 female judges with a mean age of 23.60 years ( $SD = 2.75$ ) from a German university rated the physical attractiveness of male targets on a seven-point Likert-type scale ranging from "not attractive at all" to "very attractive". Because the ratings reached adequate inter-rater reliability ( $ICC = .95$ ), averaged ratings could be used as indicators of physical attractiveness in the analysis.

### 2.2.2 Participants and procedure

Participants were 75 female students from a German university with a mean age of 22.61 years ( $SD = 3.42$ ), who were approached on campus and agreed to participate on a prescheduled date. The experiment was conducted in a medium-sized lecture hall with separate runs for several groups of raters. Participants were seated facing the projection surface with an appropriate distance between one another.

All relevant information (except for the video clips) was provided in written form to each participant via questionnaire. First, all participants read the description of an anonymous one-shot binary dictator game. The dictator was said to be endowed with €10 by the experimenter and confronted with the decision of whether to split the money equally and send €5 to an anonymous receiver or to keep the whole €10 while sending nothing to the receiver. After filling out a set of control questions concerning potential monetary outcomes of the interaction for both parties, participants were informed that they would rate the desirability of male target persons who had taken part in the dictator game described above and who would be presented on the screen.

Half of the participants were asked to rate the target persons' desirability as short-term sexual partners (i.e., "for a short-term sexual affair, where sexuality is in the foreground for both partners and where feelings don't play a role"). The other half were asked to rate the target persons' desirability as long-term romantic partners (i.e., "for a long-term relationship, where both partners are faithful and highly emotionally connected to each other, and where both partners invest heavily in a permanent relationship"). Additionally, for each target person, participants were provided with information on the target's decision in the dictator game outlined above. The information about the target persons' behavior was presented in a randomized way, with one half of the participants being informed that a given target person had split the money and one half of the participants being informed that the same target person had kept the money. To control for position effects, videos were shown in a different order for each run, with the first video in the for-

ward order being the last video in the backward order, and vice versa. Because the order of presentation did not yield any effects on desirability ratings ( $F(1,72) = .36, p = .55$ ), this factor was not further considered in the subsequent analysis.

The written descriptions of the target persons' behavior in the dictator game were matched with the corresponding video clips using identification numbers, which were announced on screen prior to each clip. Thereby, participants were able to integrate their perceptions of the targets' physical attractiveness and behavior in the dictator game accordingly and to develop an overall desirability rating. All desirability ratings were captured on seven-point Likert-type scales ranging from "not desirable at all" to "very desirable".

To summarize, 77 stimuli (target persons) with various levels of physical attractiveness were randomly presented either as altruists or as egoists and were rated on the dimension of desirability as either short-term or long-term partners, resulting in two between-subjects factors (mating context: short-term vs. long-term; dictator game behavior: egoistic vs. altruistic) for a given stimulus. After completion of the video-based rating procedure, participants answered some questions concerning their basic socio-demographic data and were then thanked for their participation and dismissed.

### **2.3 Results**

To account for the fact that information about stimuli's behavior in a dictator game and mating context varied randomly within stimuli and between participants, we estimated a mixed regression model, which treated both participants and stimuli as random effects (Judd, Westfall, & Kenny, 2012). The unit of analysis was a participant by stimulus observation, with each row of data representing the general desirability rating given by a participant on a specific stimulus (dependent variable). Stimulus' altruism (egoistic vs. altruistic), z-standardized physical attractiveness score (as provided by exogenous raters), and respective mating context (short-term vs. long-term) served as independent varia-

bles. The estimated model included three fixed effects (altruism, mating context and physical attractiveness) and three two-way (altruism x mating context, altruism x physical attractiveness, physical attractiveness x mating context) and one three-way (altruism x mating context x physical attractiveness) interactions, as well as three random error components: variation in the intercept due to stimuli and due to participants and random error variation at the level of participant by stimuli observation.

The analysis of the random components of the model indicated a significant variability of desirability ratings across stimuli (Wald  $Z = 5.20$ ,  $p < .001$ ) and across participants (Wald  $Z = 5.77$ ,  $p < .001$ ), meaning that targets' desirability ratings varied significantly across participants and targets.

Before starting to the test our hypotheses in chronological order, we first examined the effect of mating context on ratings of desirability. The temporal context of mate choice (i.e., short-term vs. long-term) showed no significant effect on overall desirability ratings ( $F(1, 73) = 1.36$ ,  $p = .25$ ), indicating that, on average, desirability ratings were no more or less generous in short-term than in long-term mating.

In the following, we systematically tested our hypotheses concerning the relevance of attractiveness and altruism in females' short-term and long-term mate choices (see Table 1).

**Table 1: Mixed regression model with desirability ratings as the dependent variable**

	<i>F</i>	<i>p</i>
<i>Fixed effects</i>		
Altruism	160.67***	< .001
Physical attractiveness	385.84***	< .001
Mating context	1.37	.25
Altruism x physical attractiveness	19.32***	< .001
Altruism x mating context	35.84***	< .001
Physical attractiveness x mating context	0.30	.58
Altruism x physical attractiveness x mating context	6.89**	.009
<i>Random effects</i>		
Variance due to participant	.15***	.03
Variance due to stimuli	.04***	.01
Error variance	.54***	.01
-2 Log Likelihood	13,269.33	

Note. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

*Hypothesis 1* stated that women would prefer physically attractive over physically unattractive men. As anticipated, physical attractiveness had an overall positive impact on ratings of desirability ( $F(1, 74) = 384.64, p < .001$ ).

*Hypothesis 2* stated that female preferences for physical attractiveness would be more pronounced in short-term than in long-term mate choices. However, there was no significant interaction between mating context and physical attractiveness ( $F(1, 5613) = .30, p = .58$ ), indicating that preferences for male physical attractiveness were equally pronounced in short-term as in long-term mate choices.

*Hypothesis 3* stated that women would prefer altruistic over egoistic men. As predicted, displays of altruism (as indicated by dictator game behavior) showed a considerable effect on desirability ratings ( $F(1, 5615) = 157.52, p < .001$ ), meaning that, on average, altruistic targets were judged to be significantly more desirable ( $M = 2.27, SD = 0.08$ ) than egoistic targets ( $M = 1.92, SD = 0.08$ ).

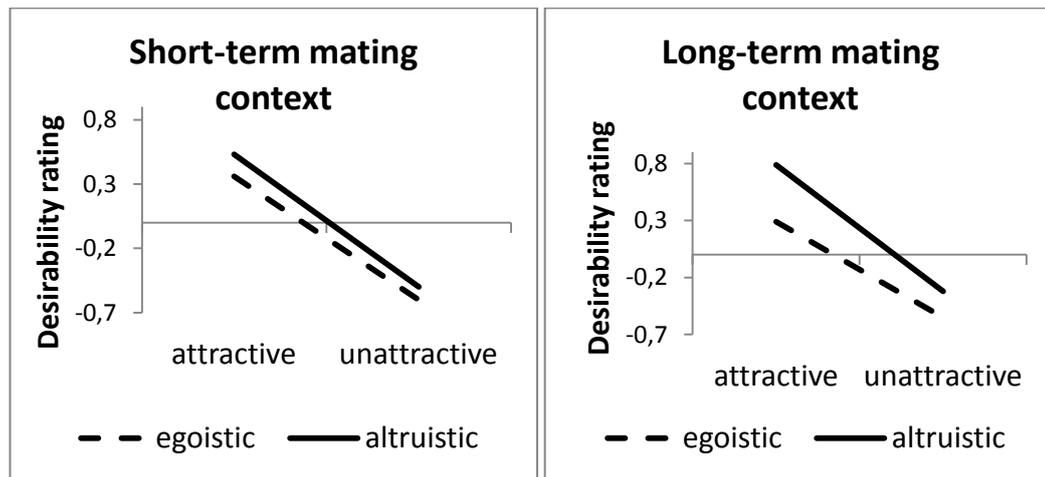
*Hypothesis 4* stated that female preferences for altruism would be more pronounced in long-term than in short-term mate choices. Indeed, there was a significant interaction between altruism and mating context ( $F(1, 5617) = 35.93, p < .001$ ). A simple effect analysis showed that al-

truistic behavior played a more important role in overall male desirability as long-term ( $b = .36, p < .001$ ) than as short-term partners ( $b = .13, p < .001$ ). As long-term partners, altruistic targets ( $M = 2.43, SD = 0.10$ ) were considered significantly more desirable than egoistic targets ( $M = 1.91, SD = 0.10$ , mean difference  $.52, p < .001$ ), whereas, in short-term partners, the effect of altruistic behavior shrank considerably but did not disappear completely ( $M = 2.11, SD = 0.10$  vs.  $M = 1.92, SD = 0.10$ , mean difference  $.19, p < .001$ ).

Furthermore, there was a significant interaction between dictator game behavior and physical attractiveness ( $F(1, 5621) = 19.31, p < .001$ ), which was further accentuated by a significant three-way interaction between dictator game behavior, physical attractiveness and mating context ( $F(1, 5623) = 6.89, p < .01$ ). This means that, in long-term mating, the impact of dictator game behavior on ratings of desirability was dependent on the physical attractiveness of the target. Namely, in the context of long-term mating, the impact of altruistic behavior on ratings of desirability was higher for attractive than for unattractive targets ( $b_{\text{altruism*attractiveness}} = .14, p < .001$ ), whereas in a short-term mating context, the effect of altruism was equally strong for attractive as for unattractive targets ( $b_{\text{altruism*attractiveness}} = .03, p = .21$ ).

Figure 1 shows the estimated overall desirability scores for long-term and short-term partners for physically attractive (one standard deviation above the mean) and physically unattractive (one standard deviation below the mean) targets described as either altruists or egoists. The findings indicate that, in a short-term mating context, both altruism and physical attractiveness influence desirability ratings (with altruism being considerably less important than it is in long-term mating). However, in the context of long-term mating, the impact of altruism on desirability ratings was not only stronger than in short-term mating but was also more pronounced among physically attractive targets.

**Figure 1: Short-term and long-term desirability ratings (z-standardized) of physically attractive (one standard deviation above the mean) and physically unattractive (one standard deviation below the mean) male targets who were described either as altruists or as egoists**



## 2.4 Discussion

This analysis has provided us with a multitude of results concerning female preferences for physical attractiveness and displays of altruism in short-term and long-term mate choices, which were partly anticipated but which also require additional reflection on a theoretical level.

Across all conditions, physical attractiveness had a substantial effect on desirability ratings, which agrees with our first hypothesis. However, contrary to our second hypothesis, male physical attractiveness was equally important in short-term as it was in long-term female mate choices. Still, this finding does not contradict previous studies indicating the importance of physical attractiveness as a marker of good genes (e.g., Gangestad, & Thornhill, 1997). Rather, it shows that good genes seem to be equally desirable in long-term mates as they are in short-term mates, as long as no constraints on the realizability of these preferences are introduced. In fact, our experimental design did not involve any type of forced choice between different potential partners who were either physically attractive or kind but captured ratings of overall desirability per se. Whether the high standards concerning physical attrac-

tiveness we observed in our experiment can be actually met in real-life female mate choices thus remains to be answered. In regard to actually finding a long-term partner and making a decision rather than making a wish, preferences for physical attractiveness may fade into the background. Across a series of studies Li et al. (2002) provided women with the opportunity to “build” ideal long-term partners by allocating a given budget to several characteristics including status and resources, kindness, intelligence, and physical attractiveness. Especially when the budget was low rather than high, women were willing to settle for considerably lower levels of physical attractiveness, while prioritizing status, resources, kindness, and intelligence. However, when constructing ideal short-term partners, women were likely to prioritize physical attractiveness (Li, & Kenrick, 2006).

On a related note, one must also consider the young age of our student sample. On the one hand, young adults are a fairly good starting point for investigating mate choice criteria because adaptive problems of mate choices and reproduction should be most relevant in early adulthood. On the other hand, the mean age at first marriage is 30.30 years for women, and the mean age at the birth of a first child is 28.90 years in Germany (United Nations Economic Commission for Europe, 2010), which is considerably older than the mean age of our sample (22.61 years). Therefore, finding a partner for life or a father for future offspring may be a task that is often postponed until the late 20s or even early 30s in a modern postindustrial society, especially among university graduates. Thus, the adaptive problems of finding a reliable long-term partner and father for future offspring may not have been a central concern in the lives of some of the young women in our student sample. It is also possible that only few of these women have ever actually had to face the insight that “you can’t always get what you want”.

In accordance with our third hypothesis, women preferred altruistic men over egoistic men. This preference was present even in short-term mating, which could partly be due to a strong fear of sexual aggression in females. In a study by Buss (1989b), women rated sexual

aggression to be by far the most upsetting of 147 potentially upsetting male behaviors (such as nonsexual physical abuse). Because propensity for sexual aggression seems to be connected to criminal and antisocial behavior in other domains (Lalumière, Harris, Quinsey, & Rice, 2005), women may direct their attention to even the slightest cues of a man's good (or bad) character, even in short-term mate choices. Likewise, women may sometimes engage in short-term mating to assess men as prospective long-term partners (Buss, & Schmitt, 1993) and frequently believe that a sexual relationship may lead to a long-term romantic relationship (Li, & Kenrick, 2006). Therefore, some of the criteria relevant to long-term mating may be applied to the choice of short-term mates as well.

However, in line with our fourth hypothesis, displays of altruism made a notably larger impact on desirability ratings in long-term than in short-term mate choices. This not only agrees with previous results by Barclay (2010) and Farrelly (2011) but also extends the findings because the proxy for altruism we employed was rather subtle and provided specific behavioral information on a decision in a one-shot, low-stakes laboratory game. Furthermore, our manipulation of altruism had to "compete" against very vivid, graphic and diversified information on physical attractiveness (i.e., video clips). We therefore assume this to be a rather conservative test regarding the relevance of altruism in short-term and long-term female mate choices. Our results clearly support the hypothesis that preferences for altruism are more relevant in long-term than in short-term mate choices, which is in accordance with the theory of strategic pluralism (Gangestad, & Simpson, 2000).

Finally, we have found that, in long-term mating, displays of altruism made a larger impact on the desirability of physically attractive than unattractive men. This result can be interpreted in various ways: in the light of what we just learned concerning the equal desirability of physical attractiveness in short-term and long-term mating, one might suggest that a lack of physical attractiveness would be a "no go", even in long-term mating, i.e., that a man who is physically unattractive can

hardly compensate for that by being nice. Second, and on a different note, one might argue that physically attractive men as carriers of good genes are a scarce resource and thus attract more female attention, rendering their behavioral displays more salient. Across a series of five studies, Maner et al. (2003) showed that both men and women selectively direct their attention towards attractive members of the opposite sex. Likewise, it has been shown that even very young infants gaze longer at more attractive adult faces and played more extensively with facially attractive dolls than with facially unattractive dolls (Langlois, Roggman, & Rieser-Danner, 1990). However, a potential premium of attention does not necessarily help more than it hurts: in terms of mate attraction, handsome men may not only receive more praise for their good deeds, they might also be condemned more severely for behaving wrongfully. According to the so-called “what is beautiful is good” heuristic (Dion, Berscheid, & Walster, 1972), physically attractive targets might have been given a “beauty premium” in advance, with good looks being (mis)taken as a sign of good character. Behaving egoistically, i.e., contrary to raters’ high expectations, may result in disappointment and therefore lead to significantly lower ratings of desirability. This would be in line with previous research by Wilson and Eckel (2006), who showed that attractive trustors in a trust game were likely to undergo a “beauty penalty” if they failed to fulfill the trustees’ high expectations. Future research needs to address the question of whether attractive individuals benefit more from behaving altruistically or whether they are condemned more harshly for behaving egoistically than less attractive individuals.

Concerning the generalizability of the results obtained in the current study, we must consider several limitations. First, with women being the more selective sex (Trivers, 1972), we decided to account for only females’ mate choices, not males’ mate choices. However, it might be interesting to replicate this study using a sample comprising both males and females. Men are said to specialize either in short-term or in long-term mating, depending on their own physical attractiveness, whereas

women are likely to follow both strategies at once (Gangestad, & Simpson, 2000; Gangestad, & Thornhill, 1997; Rhodes, Simmons, & Peters, 2005). Therefore, attributes such as fluctuating asymmetry or masculinity in male raters may be a relevant predictor for which strategy they prefer and for what they look for in female targets. Additionally, while our results showed that women found displays of altruism to be attractive even in prospective short-term mates, men may shy away from prosocial women when looking for a sexual affair. In fact, agreeableness and conscientiousness have been shown to be correlated negatively with interest in short-term mating and an unrestricted sociosexual orientation (Schmitt, & Shackelford, 2008) but positively with altruistic behavior in anonymous dictator games (Ben-Ner et al., 2004). Therefore, men may (implicitly) assume that altruistic women are “hard to get”.

Second, as stated above, rating a variety of targets concerning their desirability as either short-term or long-term partners does not (in most cases) reflect the dynamics of real-life mate choices because participants did not have to trade off one desired trait against another, yet we insist that this procedure is a thoroughly conservative test of our hypotheses. If altruism is more relevant in long-term than in short-term mate choices, even when there is no need to decide, this effect will be all the more pronounced when a trade-off is required. Therefore, we believe that our results provide strong empirical support for the theory of strategic pluralism (Gangestad, & Simpson, 2000).

The current study can contribute to the debate on the evolution of human altruism, which is largely still a puzzle (Batson, 1991; Fehr, & Fischbacher, 2003; Lehmann, & Keller, 2006). By definition, altruism is costly to the sender while granting benefits to the receiver (Trivers, 1971) and should therefore be ruled out by natural selection (Trivers, 1971). Following Miller (2000, 2007), we argue that the evolution of human altruism could be explained by sexual selection theory, with altruism as a trait that is capable of promoting one’s desirability as an intimate partner. This does not imply that sexual selection is the only evolutionary source of altruism. Actually, other contemporary theories,

such as kin selection (Hamilton, 1964), direct reciprocity (Axelrod, 1981; Trivers, 1971), indirect reciprocity (Alexander, 1987; for a review see Leimar, & Hammerstein, 2001; Nowak & Sigmund, 2005), strong reciprocity (Gintis, 2000) or multilevel selection (Wilson, 1997), provide compelling answers to the question of how altruism could have evolved. Yet, as Miller (2007, p. 98) notes, sexual selection might have served as a catalyst for the evolution of altruism, “‘supercharging’ other evolutionary processes by adding positive feedback dynamics” in terms of desirability as a mate. The theory of strategic pluralism suggests that these positive feedback dynamics may be context-dependent to some extent, hence allowing for considerable interindividual and situational variation both in preferences for altruism and in displays of altruism. Behaving altruistically may produce noteworthy gains in terms of desirability as a mate but primarily only in long-term mate choices. When looking for a short-term sexual affair, being nice may just not be worthwhile, especially if one is already handsome.

### **3 How physical attractiveness and moral virtue shape perceptions of short- and long-term desirability**

#### **3.1 Introduction**

Previous research of mate preferences has predominantly focused on exploring the characteristics women and men desire in their long-term romantic and short-term sexual partners, the ways these preferences for certain traits are prioritized with regard to sex and different mating contexts, and the conditions under which one desirable trait will be favored over another (for an overview see Buss, 2012).

However, mate choice usually does not entail making a wish list of desirable attributes in a partner, nor does it involve choosing from a set of known alternatives (Miller, & Todd, 1998). Rather, we meet different people in our day-to-day lives in various contexts: maybe at a party, at work, or even online. These people differ in various characteristics, which we may find more or less desirable in a mate. Few individuals are perfect in every way; most possess some positive and some negative attributes. Of the people we meet or interact with, some are people we would like to spend our lives with, others we would like to spend a night with, and some we prefer not to consider for either. However, how do we arrive at these judgments? Surprisingly, few researchers have addressed the question regarding the ways in which cues of different desirable (or undesirable) traits are integrated and jointly shape perceptions of the overall desirability of others in short- and long-term mating.

In the current study, we focus on physical attractiveness and displays of moral virtue. We experimentally manipulated these traits to examine the ways they contribute to perceptions of desirability in either a short- or long-term mating context. Drawing from sexual strategies theory (Buss, & Schmitt, 1993) and a cognitive perspective of mate choice (Miller, & Todd, 1998), we explored the extent to which these two factors influence desirability in short- and long-term mate choice, the ways females and males adjust their selection criteria depending on the given

mating context, and the ways cues of physical attractiveness and moral virtue are integrated to arrive at overall judgments of desirability.

### **3.1.1 Parental investment and sexual strategies theory**

According to the theory of parental investment (Trivers, 1972), the sex that invests fewer time and resources in offspring will be more competitive than the other sex, and the sex that invests more will be more selective than the other sex. As in all other mammal species, among humans, the hypothetical minimal obligatory investment in offspring is considerably higher for females than for males. Therefore, according to numerous studies, women generally are more selective concerning the *quality* of prospective mates, and men are generally more competitive for sexual access to a large *quantity* of partners (e.g., Clark, & Hatfield, 1989; Ronay, & von Hippel, 2010; Schützewohl, Fuchs, McKibben, & Shackelford, 2009; Surbey, & Conohan, 2000; Wilson, & Daly, 1985). Nevertheless, most men typically invest substantially more time and resources in offspring than the minimal investment necessary (Geary, 2000; Geary, & Flinn, 2001; Geary, Vigil, & Byrd-Craven, 2004). Thus, human mating is usually characterized by mutual mate choice; i.e., both women and men are selective regarding desirable characteristics of their potential partners and compete for access to the most desirable members of the opposite sex (Buss, 1989a, Buss et al., 1990; Geary, Vigil, & Byrd-Craven, 2004; Regan, Levin, Sprecher, Christopher, & Cate, 2000).

Sexual strategies theory (Buss, & Schmitt, 1993) extends Trivers' (1972) theory of parental investment by considering that preferences in females' and males' mate choices are not only contingent on sex, but also on the temporal context of mating. Most women and men are assumed to be equipped with distinct reproductive strategies for short-term (e.g., a one-night stand or extramarital affair) and long-term (e.g., a committed relationship or marriage) mating contexts, which include distinct adaptive preferences concerning the qualities of potential short-

term and long-term partners (Buss, 1998; Buss, & Schmitt, 1993; Gangestad, & Simpson, 2000; Regan et al., 2000).

### **3.1.2 Adaptive problems and preferences in short-term and long-term mating**

#### **3.1.2.1 Short-term mate choice**

In their short-term mate choices, men are only slightly selective, and attend mainly to signals of fertility, health, and sexual accessibility. Women, on the other hand, are more selective than men and focus predominantly on indicators of health and good genes (Buss, 2012; Buss, & Schmitt, 1993; Geary, Vigil, & Byrd-Craven, 2004). In simplified terms, markers of health and fertility in females and health and good genes in males are perceived as physical attractiveness (e.g., Fink, & Penton-Voak, 2002; Gangestad, & Scheyd, 2005; Grammer, & Thornhill, 1994; Kościński, 2008; Little, Jones, & DeBruine, 2011; Rhodes, 2006). Standards of physical attractiveness emerge early in life (Langlois, Roggman, & Reiser-Danner, 1990) and are largely consistent across races and cultures (Cunningham, Roberts, Wu, Barbee, & Druen, 1995; Jones, & Hill, 1993; for a review see, Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000). Because illustrating the determinants of physical attractiveness and their relationship to fertility, health and genetic fitness would exceed the scope of this article, we confined ourselves to considering physical attractiveness as a generally reliable proxy for all fitness-relevant physical attributes of a person. Hence, in short-term mating, women and men are expected to be especially attentive to potential partners' physical attractiveness.

#### **3.1.2.2 Long-term mate choice**

Health, fertility, and good genes are expected to be valuable in a long-term mate, as is the case in the choice of short-term mates. Therefore, females and males likely prefer attractive to less attractive long-term term partners, just as they prefer attractive to less attractive short-term partners. However, strong preferences for potential partners' moral virtue are expected as well. Women are expected to prefer morally

virtuous men because ancestral women required dependable, trustworthy and kindhearted partners who were willing to invest substantial time and resources for an extended period of time. Likewise, ancestral men needed to identify faithful and dependable women who would not engage in extramarital affairs with other men. In terms of evolutionary fitness, unwittingly investing time and resources in another man's offspring would be considered the worst-case scenario. Quasi-moral traits such as dependability, kindness, and altruism, as well as behaviors that indicate whether such traits are present, are universally highly valued in long-term mates (e.g., Barclay, 2010; Buss et al., 1990; Farrelly, 2011; Farrelly, Lazarus, & Roberts, 2007; Kelly, & Dunbar, 2001; Phillips, Barnard, Ferguson, & Reader, 2008). Therefore, in long-term mating, both women and men are expected to be especially attentive to behavioral displays that may indicate the presence or absence of moral traits such as trustworthiness, dependability, or kindness (Buss, & Schmitt, 1993; Gangestad, & Simpson, 2000).

### **3.1.3 Testing preferences across different mating contexts**

Numerous previous studies of mate preferences used explicit ratings of preselected characteristics to measure their desirability (e.g., Buss, & Schmitt, 1993), importance (e.g., Buss et al., 1990; Stewart, Stinnett, & Rosenfeld, 2000), minimum requirements (e.g., Woodward, & Richards, 2005), or percentile frequency relative to the population (e.g., Kenrick, Groth, Trost, & Sadalla, 1993; Regan, 1998; Regan et al., 2000), or the self (e.g., Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002). Other methods included building an ideal partner (e.g., Zeifman, & Ma, 2013), ranking preselected desirable traits (e.g., Buss et al., 1990), or allocating a limited budget to certain characteristics (Li, 2007; Li, Bailey, Kenrick, & Linsemeier, 2002; Li, & Kenrick, 2006).

Among the studies that considered differential preferences in short- and long-term mate choices in both sexes, there is some consensus that females are more selective than males, physical attractiveness is valued more in short- than long-term partners, and moral personality

traits such as dependability, honesty and warmth are valued more in long-term than short-term partners (e.g., Buunk, et al., 2002; Buss, & Schmitt, 1993; Jonason, Raulston, & Rotolo, 2012; Kenrick et al., 1993; Li, 2007; Li, & Kenrick, 2006; Regan, 1998; Regan et al., 2000; Stewart et al., 2000; Woodward, & Richards, 2005).

However, few researchers have experimentally manipulated potential partners' physical attractiveness and moral character simultaneously. In a forced-choice paradigm, Scheib (2001) presented pairs of men to female participants who were required to trade physical attractiveness for good character (and vice versa), either in a long-term or extra-pair mating context. For each pair of stimuli, one vignette contained a less desirable character profile that was associated with a more physically attractive picture, while the second vignette contained a more desirable character profile but a less attractive picture. As anticipated, women who were asked to choose a long-term partner were more likely to prefer the good character man over the physically attractive man than women who were asked to consider an extra-pair mateship.

Across a series of two studies, Fletcher, Tither, O'Loughlin, Friesen and Overall (2004) manipulated the perceived characteristics of potential mates regarding their warmth/ trustworthiness, attractiveness/vitality, and status/resources. Men and women were given pairs of experimental vignettes describing potential partners and asked to indicate which of the two potential mates they would choose for each of three independent scenarios: a casual date, a short-term sexual affair, and a long-term relationship. When status/resources were held constant, men preferred attractiveness/vitality to warmth/trustworthiness more often than women (this difference emerged both for short-term and long-term relationships, but not for casual dates). Additionally, for both sexes, the attractive but cold partner was preferred more often in the short-term context, while the unattractive but warm partner was favored more often in the long-term context.

However, the procedures used by Scheib (2001) and Fletcher et al. (2004) allowed for testing only the conditions under which participants

would be willing to trade attractiveness for good character (and vice versa), but not how different levels of attractiveness and moral virtue mutually shape initial perceptions of desirability in short-term and long-term mate choice. Yet, deciding in favor of one potential mate and rejecting another should (if anything) be only the final step in mate choice. It is more likely that real-life mate choice can best be understood as a sequential search rather than a selection process drawing from a set of known alternatives, because people usually tend to screen mates one at a time (Miller, & Todd, 1998). We argue that even the initial perceptions of desirability are dependent on the mating context. Specifically, physical attractiveness is expected to shape perceptions of desirability more strongly in short-term than in long-term mating, whereas moral virtue is expected to have a larger impact on long-term mating than on short-term mating. Furthermore, there are a number of reasons to assume that these effects may be more pronounced in men than in women.

#### **3.1.4 Sex differences in context-dependency**

Women may value moral virtue even with regard to their short-term mate choices. Buss and Schmitt (1993) suggested that women sometimes engage in short-term mating to assess and evaluate men as prospective long-term partners. In addition, it has been previously shown that women frequently justify casual sex based on the hope that the sexual relationship may lead to a long-term romantic relationship (Li, & Kenrick, 2006). Beyond this, women tend to rate love and emotional intimacy as the most compelling reasons to have an extramarital affair (Glass, & Wright, 1992). Furthermore, evolutionary key functions of females' short-term mating strategies may relate to obtaining immediate economic resources (Symons, 1979) and physical protection (Smuts, 1985). Either function would be contingent on finding a kind and trustworthy short-term partner, who will honor their mating agreement. From a different point of view, female preferences for morally virtuous men may be partly because most women possess a strong

fear of sexual aggression (Buss, 1989b). This may influence women to be very attentive to cues of a man's morality, even when assessing short-term sexual partners. Men, on the other hand, are not assumed to derive benefits such as protection and resources from having a short-term relationship with a morally virtuous woman and are less prone to believing that a sexual affair may evolve into a committed relationship. Men even place considerably greater emphasis on physical attractiveness than women, especially in a short-term context (Li, & Kenrick, 2006).

In long-term mating, however, men may react more strongly than women to displays of moral virtue (such as loyalty and trustworthiness). This may possibly reflect evolutionary pressure to minimize paternity uncertainty. As noted above, unwittingly investing time and resources in another man's offspring is an evolutionary worst-case scenario for males. Indeed, men have been shown to exhibit stronger preferences for faithfulness and sexual loyalty (Buss, & Schmitt, 1993) and to display higher levels of sexual jealousy than women (Buss, Larsen, Westen, & Semmelroth, 1992).

As a result, males' preferences are expected to be more context-dependent than females' preferences. Specifically, male preferences are expected to be somewhat more "clear-cut" and more closely aligned to respond to particular male adaptive problems in either long-term or short-term mate choice than females' preferences. Females, on the other hand, are expected to be more "generalist" in their mate choices than males.

### **3.1.5 Interplay between physical attractiveness and moral virtue**

In accordance with Miller's and Todd's (1998) cognitive perspective on mate choice, we doubt that cues of a potential mate's underlying qualities will be integrated linearly to form overall evaluations of desirability. Jensen-Campbell, Graziano and West (1995) demonstrated that dominance cues positively influenced ratings of dating desirability only if they were paired with cues of agreeableness. Likewise, Lundy, Tan

and Cunningham (1998) showed that humorous individuals were rated more desirable as partners for a serious long-term relationship or marriage than non-humorous individuals, but only if they were also physically attractive. Assuming that any desirable trait will be linearly traded for any other trait does not make evolutionary sense because “such compensatory integration of cues might prove extremely maladaptive in mate choice, because successful reproduction is a complex causal chain, only as strong as the weakest link” (Miller, & Todd, 1998, p. 195). Therefore, if a potential mate fails to meet a certain threshold concerning an important criterion trait (e.g., physical attractiveness), there will be little chance to compensate. Likewise, meeting or surpassing several requirements at once (e.g., being both highly attractive and morally virtuous), may be worth more than the sum of its parts.

### **3.1.6 Current research**

In the current study, we simultaneously and independently manipulated female and male targets in their physical attractiveness and moral virtue. We then subsequently measured the impact of these manipulations on ratings of short-term and long-term desirability to test predictions derived from sexual strategies theory (Buss, & Schmitt, 1993) and Miller and Todd’s (1998) cognitive perspective on mate choice.

In accordance with the above-mentioned theories and existing empirical data, we derived the following four hypotheses:

*Hypothesis 1:* Physical attractiveness affects perceptions of desirability more strongly in short-term than in long-term mate choice.

*Hypothesis 2:* Moral virtue affects perceptions of desirability more strongly in long-term than in short-term mate choice.

*Hypothesis 3:* Perceptions of desirability depend more strongly on the specific mating context for males than for females.

*Hypothesis 4:* Moral virtue and physical attractiveness mutually reinforce regarding their effects on perceptions of desirability.

## **3.2 Method**

### **3.2.1 Pretest of stimulus materials**

#### **3.2.1.1 Manipulation of physical attractiveness**

Seventy-four female and 77 male students ( $N = 151$ ) from a Dutch university were videotaped sitting in front of a white wall while introducing themselves to the camera. The videos were cut into silent 20-second clips with ten-second transitions between clips. During transitions, the identification number of the upcoming video was displayed. Based on these clips, 25 female and 15 male judges from a German university, who were aged between 19 and 32 years ( $M = 23.83$ ,  $SD = 3.25$ ), rated the physical attractiveness of opposite-sex targets using a seven-point Likert-type scale ranging from “not attractive at all” to “very attractive.” Because attractiveness ratings given by both male ( $ICC = .96$ ) and female ( $ICC = .95$ ) raters reached adequate levels of inter-rater reliability, ratings were averaged across all raters and used as indicators of physical attractiveness in the subsequent analysis.

#### **3.2.1.2 Manipulation of moral virtue**

Perceptions of morality were manipulated by informing participants of each stimulus’ hypothetical decision as a trustee in a one-shot binary trust game, which was described as follows: Person A (the trustor) was given €5 by the experimenter and could freely decide whether she would send these €5 to Person B (i.e., the trustee) or keep the €5 and leave the interaction. In the latter case, Person A would walk away with €5, while Person B would receive nothing. In the former case, however, the experimenter would raise the amount sent by an additional €15, so Person B would receive a total of €20 at her disposal. If this was the case, Person B would then have to decide, whether to walk away with the €20 and send nothing back to Person A, or to send €10 back to Person A, so both Person A and Person B would leave the interaction with €10 each. The language used was as neutral as possible, i.e., we avoided words like “trustor”, “trustee”, “trusting” etc. and used terms like “Person A”, “Person B”, “sending” etc.

Based on this description, 45 female and 20 male students from a German university, who were aged between 20 and 37 years ( $M = 23.14$ ,  $SD = 3.35$ ), evaluated the behavior of a hypothetical opposite-sex Person B in terms of morality (“Person B behaved in a morally righteous way”) on a seven-point Likert-type scale ranging from “does not apply at all” to “does fully apply.” Using a between-subjects design, half of the raters were told that Person B kept the whole €20 for herself, while the other half were told that Person B sent €10 back to Person A.

A two-way ANOVA was conducted using the rater’s sex and Person B’s behavior as independent variables and the morality rating as the dependent variable. The ANOVA revealed that both females and males perceived sending €10 back to Person A to be significantly more morally righteous ( $M = 5.62$ ,  $SD = 1.71$ ) than keeping the whole €20 ( $M = 1.90$ ,  $SD = 1.09$ ),  $F(1, 60) = 83.43$ ,  $p < .001$ ). Neither the effect of rater’s sex ( $F(1, 60) = 2.91$ ,  $p = .09$ ) nor the interaction between sex and Person B’s behavior ( $F(1, 60) = 1.73$ ,  $p = .19$ ) were significant.

The results suggest that raters used Person B’s behavior in a binary trust game as basis for moral judgment. Therefore, we are confident that behavior in the trust game is suitable as a proxy for the broader concept of moral virtue.

### **3.2.2 Main study**

#### **3.2.2.1 Sample**

For the main study, 154 German university students registered for a study of “attractiveness judgments” via email and were subsequently assigned to participate on a prescheduled date. Two participants were excluded from further analyses because they failed to correctly answer at least one out of six control questions regarding the monetary outcomes of the binary trust game. Another eleven participants were excluded because they reported to be homo- ( $n = 3$ ) or bisexual ( $n = 7$ ) or did not indicate their sexual orientation ( $n = 1$ ). The remaining sample of 141 heterosexual persons comprised 84 (59.6%) females and 57 (40.4%) males aged between 18 and 46 years ( $M = 24.17$ ,  $SD = 4.08$ ).

### 3.2.2.2 Procedure

The experiment was conducted in different medium-sized lecture halls with several separate runs for groups of male or female raters. Participants were seated facing a projector screen with an appropriate distance between each other.

All relevant information (except for the video clips) was provided for each rater in written form via questionnaire. First, subjects learned about the general features and consequences of the one-shot binary trust game described above. Thereafter, participants answered six control questions concerning the potential monetary outcomes for Persons A and B. Finally, participants were informed that they were about to rate the desirability of other-sex target persons presented on the screen and that these target persons had participated in the trust game as Person B (i.e., the trustee).

Half of the participants were asked to rate the target persons' desirability as short-term sexual partners (i.e., "for a short-term sexual affair"). The other half of the participants were asked to rate the target persons' desirability as long-term romantic partners (i.e., "for a long-term relationship").

For each target person, raters were provided information regarding the target's behavior in the trust game. Information regarding targets' behavior as trustees was presented using a randomized and counter-balanced design, i.e., half of the participants were informed that a given target person had send €10 back to Person A (i.e., behaved trustworthily), while the other half of the participants were informed that the very same target person had kept the whole €20 (i.e., behaved untrustworthily).

The written information concerning targets' behavior was matched with the corresponding video clips using identification numbers, which were announced on screen prior to each clip. Thereby, participants were able to integrate their perceptions of the targets' physical appearance and moral virtue accordingly, and to generate an overall desirability rat-

ing. All desirability ratings were gathered on a seven-point Likert-type scale ranging from “not desirable at all” to “very desirable”.

After completion of the video-based rating procedure, participants answered questions concerning their basic socio-demographic data, were thanked and dismissed. Thirteen randomly selected participants were awarded with cash prizes ranging from €10 to €100 (1 x €100, 2 x €50, 10 x €10).

In sum, female and male target persons of various levels of physical attractiveness were randomly presented as either trustworthy or untrustworthy to raters of the opposite sex. Raters then evaluated each target’s desirability either as a short- or long-term partner.

### **3.3 Results**

To account for the fact that information about targets’ behavior in the trust game and mating context varied randomly within targets and between raters, we estimated a mixed regression model, which treated both raters and targets as random effects (Judd, Westfall, & Kenny, 2012). The unit of analysis was a rater by target observation. Each row of data represented the desirability rating given by a specific rater to a specific target (dependent variable), with mating context (short-term vs. long-term), rater’s sex (female vs. male), target’s z-standardized (separately within sexes) physical attractiveness score (as provided by exogenous raters), and target’s trustworthiness (untrustworthy vs. trustworthy) as independent variables. The estimated model included four fixed effects (mating context, target’s trustworthiness, rater’s sex, and target’s physical attractiveness), six two-way interactions, four three-way interactions, and one four-way interaction, as well as three random error components: variation in the intercept due to targets, raters, and random error at the level of rater by target observation.

The analysis of the random components of the model indicated significant variability in the desirability ratings across targets (Wald  $Z = 5.70$ ,  $p < .001$ ) and raters (Wald  $Z = 8.04$ ,  $p < .001$ ), i.e., targets’ desirability ratings varied significantly across raters and targets.

With regard to the fixed effects, the four-way interaction was not significant ( $F(1, 10398) = 1.57, p = .21$ ); therefore, we proceeded directly to analyzing lower-order interactions, which were arranged in the same order as our initial hypotheses (see Table 2).

**Table 2: Mixed regression model with desirability ratings as the dependent variable**

	<i>F</i>	<i>p</i>
<i>Fixed effects</i>		
Mating context	0.32	.58
Rater's sex	46.40***	< .001
Target's attractiveness	2,558.28***	< .001
Target's trustworthiness	278.33***	< .001
Mating context x rater's sex	1.85	.18
Mating context x target's attractiveness	81.22***	< .001
Mating context x target's trustworthiness	106.15***	< .001
Rater's sex x target's attractiveness	88.13***	< .001
Rater's sex x target's trustworthiness	0.00	.98
Target's attractiveness x target's trustworthiness	21.26***	< .001
Mating context x rater's sex x target's attractiveness	38.71***	< .001
Mating context x rater's sex x target's trustworthiness	18.70***	< .001
Mating context x target's attractiveness x target's trustworthiness	20.19***	< .001
Rater's sex x target's attractiveness x target's trustworthiness	0.36	.55
Mating context x rater's sex x target's attractiveness x target's trustworthiness	1.57	.21
<i>Random effects</i>		
Variance due to raters	0.49***	< .001
Variance due to targets	0.03***	< .001
Error variance	1.11***	< .001
-2 Log Likelihood	32,135.71	

Note. \*\*\*  $p < .001$ .

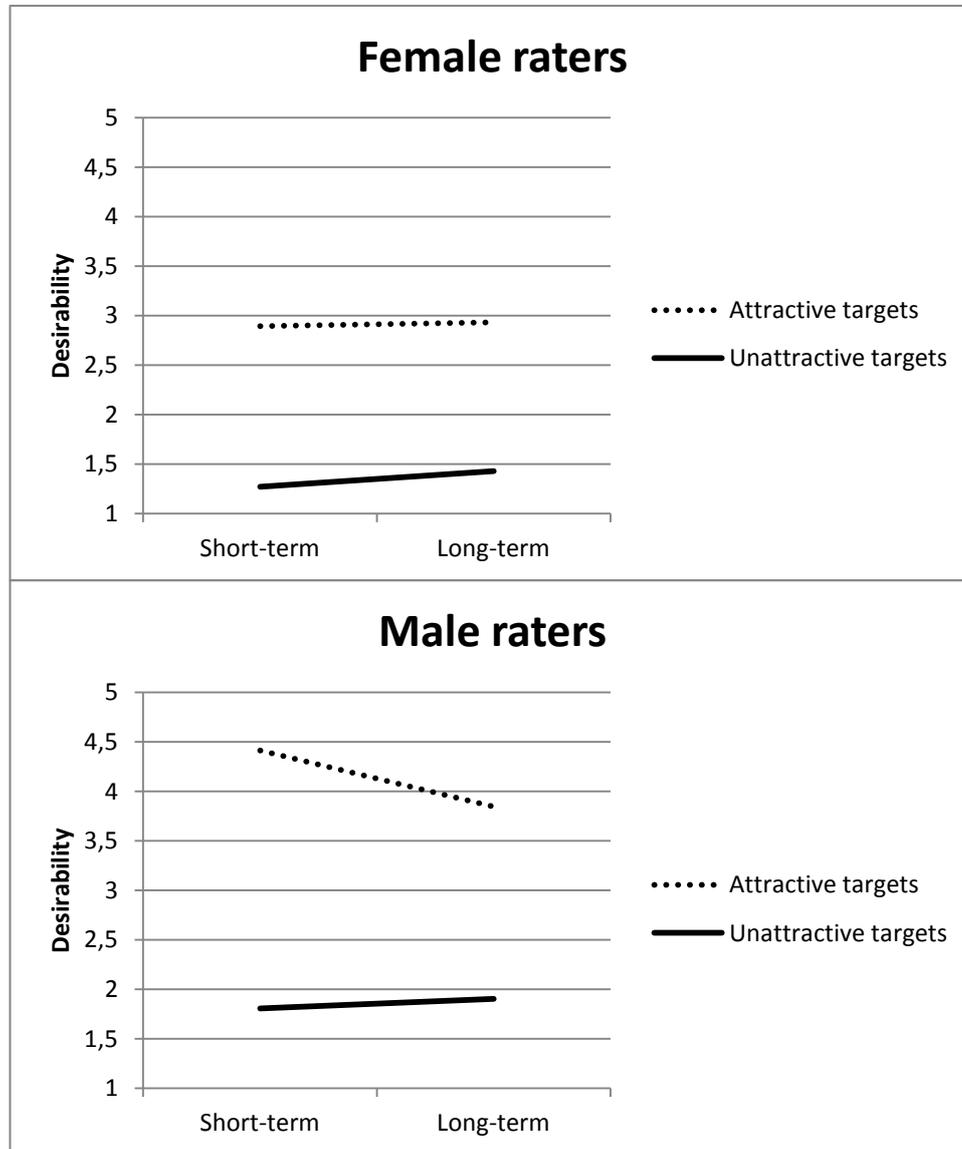
*Hypothesis 1* stated that physical attractiveness would affect perceptions of desirability more strongly in short-term than long-term mate choice. As predicted, there was a significant two-way interaction between physical attractiveness and mating context ( $F(1, 10383) = 81.22, p < .001$ ), indicating that the impact of physical attractiveness on mate desirability ratings was stronger in the short-term ( $b_{\text{attractiveness}} = 1.03, p$

< .001) than in the long-term ( $b_{\text{attractiveness}} = 0.86, p < .001$ ) mating context.

*Hypothesis 2* stated that moral virtue would affect perceptions of desirability more strongly in long-term than short-term mate choice. A significant interaction among targets' trustworthiness and mating context showed this to be the case,  $F(1, 10396) = 106.15, p < .001$ . That is, displays of trustworthiness more greatly impacted desirability ratings in the long-term context ( $b_{\text{trustworthiness}} = 0.57, p < .001$ ) than the short-term context ( $b_{\text{trustworthiness}} = 0.16, p < .001$ ).

*Hypothesis 3* stated that perceptions of desirability would depend more strongly on the specific mating context for males than for females. This hypothesis was supported with respect to both physical attractiveness and trustworthiness. First, there was a significant three-way interaction between physical attractiveness, mating context, and raters' sex,  $F(1, 10383) = 38.71, p < .001$ . This indicates that male raters were more prone to prioritize physical attractiveness in short-term as compared to long-term mate choice ( $b_{\text{attractiveness*context}} = -0.33, p < .001$ ) than female raters ( $b_{\text{attractiveness*context}} = -0.06, p < .05$ ), see Figure 2.

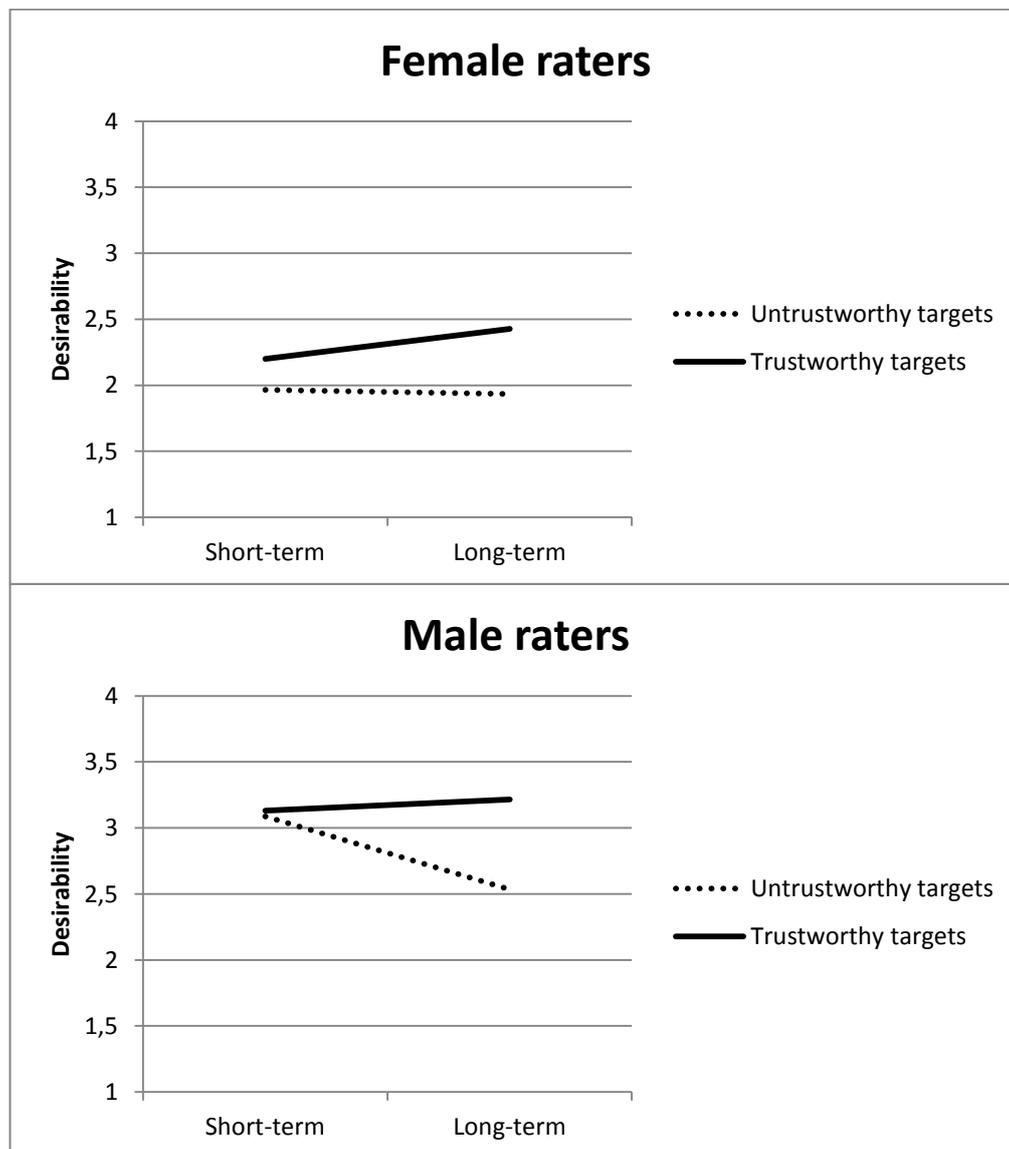
**Figure 2: Short-term and long-term desirability ratings of physically attractive (one standard deviation above the mean) and physically unattractive (one standard deviation below the mean) targets for female and male raters**



Second, there was a significant three-way interaction between targets' trustworthiness, mating context, and raters' sex,  $F(1, 10396) = 18.70$ ,  $p < .001$ . This interaction indicates that the temporal context of mating exerted a stronger influence on male ( $b_{\text{trustworthiness} \times \text{context}} = 0.63$ ,  $p < .001$ ) than on female ( $b_{\text{trustworthiness} \times \text{context}} = 0.26$ ,  $p < .001$ ) preferences for displays of moral behavior. Namely, the strength of female preferences for males' trustworthiness increased from slight ( $b_{\text{trustworthiness}} =$

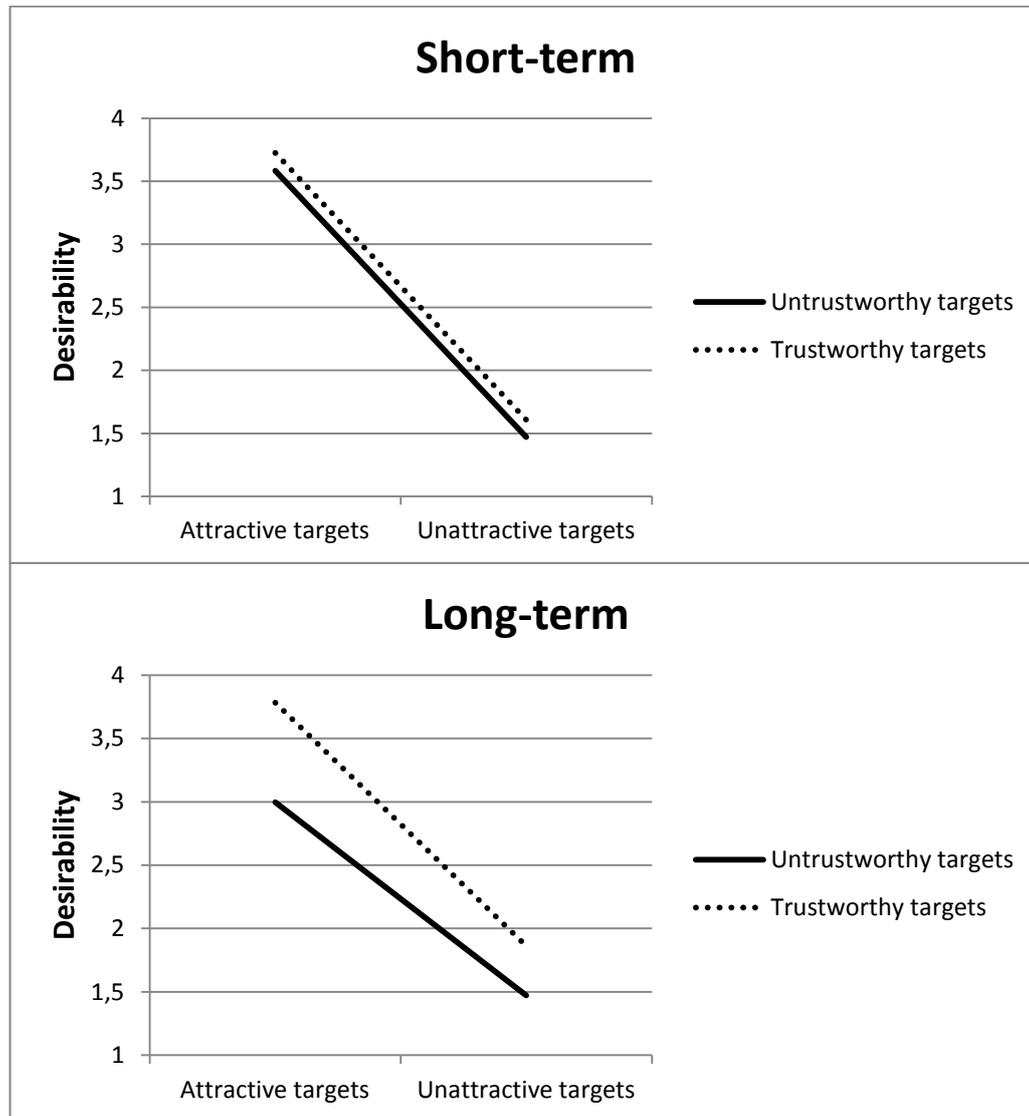
0.23,  $p < .001$ ) in short-term mating to moderate in long-term mating ( $b_{\text{trustworthiness}} = 0.49$ ,  $p < .001$ ), whereas the strength of male preferences for females' trustworthiness increased from non-existent in short-term mating ( $b_{\text{trustworthiness}} = 0.04$ ,  $p = .36$ ) to strong in long-term mating ( $b_{\text{trustworthiness}} = 0.68$ ,  $p < .001$ ), see Figure 3. In summary, the magnitude of preferences concerning both physical attractiveness and moral virtue was more dependent on the temporal context of mating for males than for females.

**Figure 3: Short-term and long-term desirability ratings of targets who were described as either trustworthy or untrustworthy for female and male raters**



*Hypothesis 4* stated that moral virtue and physical attractiveness would mutually reinforce regarding their effects on perceptions of desirability. As anticipated, we found a significant interaction between targets' trustworthiness and physical attractiveness ( $F(1, 10397) = 21.26, p < .001$ ), which was qualified by a three-way interaction with mating context ( $F(1, 10399) = 20.19, p < .001$ ). More specifically, trustworthy individuals were rated as more desirable short-term partners, regardless of their physical attractiveness. Stated differently, physically attractive individuals were rated as more desirable short-term partners regardless of their trustworthiness ( $b_{\text{trustworthiness*attractiveness}} = 0.01, p = .69$ ). In contrast, targets' trustworthiness and physical attractiveness mutually reinforced in the long-term mating context ( $b_{\text{trustworthiness*attractiveness}} = 0.20, p < .001$ ). Namely, in long-term mating, targets' trustworthiness impacted ratings of attractive targets ( $b_{\text{trustworthiness}} = 0.76, p < .001$ ) considerably more than for less attractive targets ( $b_{\text{trustworthiness}} = 0.37, p < .001$ ), see Figure 4. As predicted by Hypothesis 4, physical attractiveness and perceptions of moral virtue mutually reinforced each other, but only in a long-term mating context.

**Figure 4: Short-term and long-term desirability ratings of physically attractive (one standard deviation above the mean) and physically unattractive (one standard deviation below the mean) targets who were described either as trustworthy or untrustworthy**



### 3.4 Discussion

In summary, our results support all four of our initial hypotheses. Physical attractiveness shaped perceptions of desirability more strongly in short-term than in long-term mating (Hypothesis 1), and moral virtue impacted long-term mating more than short-term mating (Hypothesis 2). Furthermore, we demonstrated that males adjust their mate choice criteria more strongly to the given mating context than women (Hypoth-

esis 3), and that physical attractiveness and moral virtue mutually reinforce each other (Hypothesis 4), albeit only in a long-term mating context.

Our results contribute to the research of preferential mate choice both on a methodological and theoretical level. First, we were able to replicate results obtained by Scheib (2001) and Fletcher et al. (2004) using a different and innovative methodology. Physical attractiveness played a lesser role in long-term than short-term mate choice, while the opposite was true for moral virtue. These findings are congruent with previous survey-based studies of mate preferences (e.g., Buss, & Schmitt, 1993; Regan et al., 2000; Stewart et al., 2000). However, we argue that our methodology is particularly ecologically valid. Real-life mate choice most likely does not entail a conscious ex-ante definition of certain standards concerning various criteria, and it usually does not comprise choices between known alternatives each of whom have specific strengths and weaknesses (Miller, & Todd, 1998). Rather, real-life mate choice is generally expected to operate on differences in attraction to distinct potential partners. Therefore, it can be best understood as a process of sequential choice and general “screening” of potential partners in terms of desirability (Miller, & Todd, 1998). In conclusion, manipulating the characteristics of potential partners and measuring differences in perceptions of desirability appears to be reasonable and ecologically valid.

Second, we found some evidence that males’ preferences were more context-dependent than females’ preferences, regarding both physical attractiveness and moral virtue. For men, potential partners’ physical attractiveness more greatly impacted short-term than long-term mate choice, whereas moral virtue was more relevant in long-term than short-term mate choice. Females, on the other hand, appeared to be more generalist and less context-specific in the way they evaluated potential mates. Future research must specifically address the question of why this is the case and under which conditions. Some women may entertain the idea that a short-term sexual affair could lead to a long-term

romantic relationship (Buss, & Schmitt, 1993; Li, & Kenrick, 2006). They may then apply some of their selection criteria for long-term partners to short-term partners. Other women may shy away from having even a short-term sexual relationship with an immoral man due to a strong fear of sexual aggression (Buss, 1989b). Men, on the contrary, were prone to prioritize moral virtue considerably more strongly in long-term than short-term mating. In a study by Buss and Schmitt (1993), American men rated faithfulness and sexual loyalty to be the most desirable traits and unfaithfulness to be the least desirable trait in potential long-term female partners. In short-term mating, however, female displays of moral virtue did not affect their overall desirability, whereas female physical attractiveness had a distinctly strong effect on desirability. It appears that in short-term mating, moral virtue is of no concern for men. In this context, men rely solely on cues of health and fertility as the basis of their desirability judgments.

Third, other than Scheib (2001) and Fletcher et al. (2004), we manipulated physical attractiveness and displays of moral virtue simultaneously and independently; this allowed us to gain insights concerning the way these cues are integrated and how they jointly shape perceptions of desirability. In long-term mating, in which physical attractiveness and moral virtue both were important predictors of desirability, these variables were mutually reinforcing. In other words, displays of moral virtue had greater bearing on the perceived desirability of attractive targets than less attractive targets (and vice versa). This may suggest that desirability is more than the sum of its parts, which is congruent with Miller and Todd's (1998) cognitive perspective of mate choice. Future research must further investigate and clarify the proximate mechanisms underlying these effects. In our study, we used cues that were related to different underlying qualities (i.e., health, fertility, and good genes vs. moral virtue and good character), which were presented simultaneously. In future studies, researchers should vary both the nature and magnitude of different cues (e.g., facial vs. bodily attractive-

ness, or good character vs. economic resources), and account for the sequence in which these cues are integrated.

Regarding the generalizability of our results, some limitations must be addressed. First, we recruited a student sample with a mean age of only 24.17 years. Traits that women and men prioritize in a partner may be subject not only to sex and mating context, but also to socioeconomic, psychological, and cultural variables, such as age, income, education, sociosexual orientation, and the level of female empowerment in a culture. However, we assume that people in their mid-twenties are a fairly good starting point for investigating mate-choice criteria.

Second, we used behavioral information regarding decisions as trustee in a one-shot trust game as a proxy for moral virtue. Though this information was unequivocally used as the basis for moral judgment, one may think of various other cues of morality (e.g., unfaithfulness in a previous relationship or tax evasion), which may potentially evoke stronger or weaker effects. However, experimental vignettes containing rather mundane and lifelike cues of the presence of moral virtue, or lack thereof, may differ latently in dimensions other than the one that was intended for manipulation. We are confident that informing raters of targets' decisions in an experimental game appears to be both highly credible and unlikely to corrupt neutrality.

In summary, it can be stated that the current research has elucidated the way physical attractiveness and moral virtue shape perceptions of desirability in females' and males' short- and long-term mate choices. We have also confirmed the significance of sexual strategies theory as a key concept governing preferential mate choice using an innovative and ecologically valid methodology. Furthermore, we have gained firsthand insights into sex differences regarding the context-dependency of mate preferences, which is a subject that must be further investigated in future studies. Finally, our research has provided an empirical backing to the cognitive perspective of mate choice and confirmed that desirability is more than the sum of its parts.

Groundbreaking contributions to mate choice research, such as parental investment theory (Trivers, 1972) or sexual strategies theory (Buss, & Schmitt, 1993), have inspired countless researchers to push the boundaries of what is known about human mate choice. However, it appears to be just the tip of the iceberg. Human mating appears to be more complex than one may be inclined to think.

## **4 On the social perception of trust: warmth, competence, and global evaluations**

### **4.1 Introduction**

Trust may be considered the single most important underpinning of virtually any kind of social relationship. Without trust, intimate relationships would be fleeting and shallow (Dion, & Dion, 1976; Larzelere, & Huston, 1980; Rempel, Holmes, & Zanna, 1985), organizational life would be riddled with demoralizing mutual suspicion (Kramer, 1999; Kramer, & Tyler, 1996), economies would fall into decline (Knack, & Keefer, 1997; Zak, & Knack, 2001), and democracies would perish (Fukuyama, 1995; Sullivan, & Transue, 1999). However, no matter how essential trust is for human social coexistence, researchers struggle to answer the question of exactly why people trust one another. People trust even when they are told that the odds of reciprocation are low and when there is little or even nothing to gain (Dunning, Fetchenhauer, & Schlösser, 2012; Fetchenhauer, & Dunning, 2012). Likewise, people systematically underestimate others' trustworthiness but trust nonetheless (Fetchenhauer, & Dunning, 2009). These findings challenge the view that trust is an economic, instrumental act governed by perceptions of risk and expectations of future benefit (e.g., Rousseau, Sitkin, Burt, & Camerer, 1998). Rather, trust appears to be an expressive act governed by the emotions surrounding the act of trusting itself and not its potential consequences (Dunning, & Fetchenhauer, 2010; Dunning et al., 2012). We will add to the ongoing discussion of why people trust by exploring some noneconomic reputational benefits (or costs) that trust behavior may convey. Specifically, we will examine how trust is perceived with regard to fundamental dimensions of social judgment and person perception, namely, warmth and competence, and how these perceptions translate into global evaluations of the character of others.

#### **4.1.1 Social perception of trust**

A noneconomic explanation for trust is that trust serves as some kind of social signal, boosting an individual's reputation as a valuable cooperation partner (Dunning et al., 2012). Indeed, humans sometimes behave selflessly to strategically invest in their reputations among their peers (e.g., Barclay, 2013; Milinski, Semmann, & Krambeck, 2002; Nowak, & Sigmund, 2005; Semmann, Krambeck, & Milinski, 2004). However, what exactly is required to have a reputation as a valuable cooperation partner? A likely and obvious answer is that people prefer partners who are both willing and able to cooperate, a notion that finds strong support in the vast literature on social judgment and perception (e.g., Fiske, Cuddy, & Glick, 2007; Cuddy, Glick, & Beninger, 2011; Wojciszke, 2005).

Therefore, the two basic dimensions of social perception and social judgment are warmth (also referred to as morality) and competence (for a review see Cuddy et al., 2011; Fiske et al., 2007). Perceptions of warmth relate to the social and moral evaluation of an individual and therefore refer to perceived intent. Competence refers to perceived ability and therefore finds its expression in judgments of ability and intellectual prowess. Thus, perceptions of warmth and competence jointly reflect basic aspects of survival, namely, whether others intend to harm or to help and whether they will be able to carry out these intentions (Fiske et al., 2007).

Still, one must address the question of whether and how trustful behavior influences perceptions of warmth and competence. The problem with trust is that it might be a double-edged sword, both in terms of warmth and in terms of competence. This means that depending on the specific situation, trustful behavior may be perceived as warm or cold and, likewise, as competent or incompetent. The following examples may serve to illustrate this dichotomy.

Consider warmth: Lending your station wagon to a friend because he is moving requires some trust in your friend. Similarly, asking a neighbor to feed your cat while you are on a vacation requires trust in

your neighbor. Although both actions entail trusting someone, the former seems to be rather charitable and may be perceived as a sign of warmth, whereas the latter appears to be rather self-interested and cold. Now consider competence: Trusting a certified car mechanic at a licensed auto repair shop to properly fix your car's brakes seems rather smart and may therefore evoke notions of competence, whereas getting the job done at a run-down back alley workshop may be associated with gullibility or even foolishness and thus may call forth associations of incompetence.

However, even a single instance of trustful behavior may lead to entirely different inferences regarding warmth and competence. Consider the standard behavioral measure of generalized trust: the trust game, also referred to as the investment game (Berg, Dickhaut, & McCabe, 1995; for a recent review, see Johnson, & Mislin, 2011). Two subjects, the trustor and the trustee, are randomly paired for an anonymous one-shot interaction. The trustor receives some money from the experimenter and is free to keep the money and leave the interaction (i.e., to distrust) or to send some proportion of the money to an unknown trustee (i.e., to trust). In the latter case, the experimenter will multiply the sent amount and pass it on to the trustee. The trustee is now free to decide how much of the multiplied amount he wants to keep for himself and how much he wants to send back to the trustor. However, what do people think of those who trust or distrust in such a situation?

Regarding competence, one needs to keep in mind that from a strictly economic perspective, trusting is never rational. Every rational and self-interested trustee should never reciprocate because the interaction is anonymous and onetime. Therefore, every rational and self-interested trustor should never trust because he should anticipate inevitable deceit. However, many trustees choose to reciprocate (Berg et al., 1995; Fetchenhauer, & Dunning, 2009; Johnson, & Mislin, 2011). Given sufficient risk tolerance and substantial chances of trust being met with reciprocity, trusting may well be rational, even in a strictly economic sense.

Even regarding warmth, however, the situation is ambiguous: Does a trustor send his money to the trustee because he feels some moral obligation to do so? Do empathy, compassion and a striving for fairness lead to trust, so that the trustee does not have to leave the interaction empty-handed, or is there only cold and selfish calculation, with trust solely driven by the desire to maximize one's own payoff? Some researchers have shown that altruism is a positive predictor of trust behavior in the trust game (e.g., Kanagaretnam, Mestelman, Nainar, & Shehata, 2009). However, others have gone to great lengths to disentangle trust from altruism and to prove that other-regarding preferences are by no means sufficient to explain trust (Cox, 2004; Dunning et al., 2012). Moreover, even if a trustor's motivation is purely altruistic and selfless, people are prone to construing selfless behavior in terms of self-interest, i.e., they are overly cynical concerning the motives underlying others' behavior (Cricher, & Dunning, 2011). Therefore, answering the question of how trust behavior is perceived by others is by no means trivial, especially in the frame of the trust game.

Krueger, Massey, and DiDonato (2008) provide first insight into the social perception of trust: In the context of a one-shot continuous trust game following the Berg, Dickhaut, and McCabe (1995) procedure, subjects rated a trustor who had invested either \$0, \$5, or \$10 with regard to four different traits pertaining to warmth and competence. Perceptions of trustors' warmth were positively associated with the amounts invested. However, ratings of competence were only weakly related to the proportions invested. Specifically, only players who invested partial amounts (\$5) were judged to be slightly more competent than were players investing either nothing or their full endowment of \$10, whereas the ones who invested nothing were not judged to be more or less competent than were the ones who invested their full endowment. Overall, the effects on ratings of competence were so weak that the authors doubted their practical significance.

With preliminary evidence indicating a positive relationship between trust and perceptions of warmth but no meaningful relationship

between trust and perceptions of competence, one must further consider that sources of ambiguity in the social judgment of trust behavior may not only arise out of the act of trusting itself. An additional source of ambiguity may lie within the observer of trustful or distrustful behavior. Specifically, people may adjust their judgments of others' warmth and competence under consideration of whether they would have trusted or distrusted in a similar situation. We will refer to this as *social projection*.

#### **4.1.2 Social projection**

People tend to use themselves as standards for comparison in social judgment and frequently imagine how they would react if they were in someone else's situation (Dunning, & Hayes, 1996). Social projection may not only lead to biased inferences concerning how others would behave in a specific situation given one's own presumed behavior but may also cause biased judgments concerning the dispositions underlying others' dissimilar behavior (Ross, Greene, & House, 1977; Van Boven, & Loewenstein, 2005).

Especially with regard to judgments of competence, one may intuitively argue that the social judgment of other's trustful or distrustful behavior is likely subject to social projection. If someone acts trustfully in a situation where someone else would not exhibit trust (e.g., lending one's cellphone to a sneaky-looking stranger), that someone else may regard such behavior as gullible or naïve and thus question the actor's competence. Rotter (1980) distinguishes trust from gullibility by defining trust "as believing communications in the absence of clear or strong reasons for not believing" (p. 4) and gullibility "as believing when most people in the same social group would consider belief naïve and foolish" (p. 4) and arrives at the conclusion that "high trusters are no more gullible than low trusters" (p. 4). However, people who would not trust in the very same situation are likely to perceive such "clear or strong reasons" not to trust and may therefore associate trust with gullibility.

Similarly, people who would trust in the same situation may instead regard others' distrust as a sign of incompetence.

However, perceptions of warmth may also be subject to these considerations. People scrutinize selfless behavior for selfish motives (Critcher, & Dunning, 2011). This effect may even be stronger for people who would distrust in a similar situation because they may try to maintain self-serving assessments concerning their own moral superiority (e.g., Epley, & Dunning, 2000; for reviews, see Alicke, & Govorun, 2005; Gilovich, Epley, & Hanks, 2005). Additionally, they are likely to experience greater understanding for and empathy towards those who distrust. Likewise, people who would trust in a similar situation may feel moral outrage and condemn distrustful behavior even more severely.

Consequently, social projection can be assumed to affect judgments of both warmth and competence with regard to both distrustful and trustful behavior. However, Krueger et al. (2008) examined whether judgments of trustors' warmth and competence were moderated by raters' own hypothetical decisions in the role of the trustor. The only statistically significant effect emerged concerning ratings of competence, i.e., raters who would personally trust less perceived a fully investing trustor to be more competent than did raters who would also fully invest. This finding was not in line with any of the authors' a priori hypotheses and was therefore considered an anomaly. Still, ruling out the effects of social projection on perceptions of trust and distrust altogether might be a bit premature, especially on the basis of only one study. Across two studies, we therefore further investigated the potential effects of social projection on perceptions of trust and distrust.

## **4.2 Study 1**

Study 1 aimed at investigating how trust and distrust shape perceptions of warmth and competence and whether social projection influences these perceptions. Different from Krueger et al. (2008), we employed a binary instead of a continuous trust game as the situational environment for the rating procedure. In the binary trust game we em-

ployed, Person A (the trustor) was said to be endowed with €5 by the experimenter and could freely decide whether she would send her endowment (i.e., trust) to an unknown Person B (the trustee) or whether she would keep the money and leave the interaction (i.e., distrust). If Person A decided to distrust, she would walk away with €5, and Person B would receive nothing. However, if Person A decided to trust Person B, the experimenter would raise the amount sent by an additional €15, so Person B would receive a total of €20 at her disposal. If this was the case, Person B would then have to decide whether to walk away with the €20, sending nothing back to Person A, or whether to send €10 back to Person A, so both Person A and Person B would leave the interaction with €10 each.

In the continuous trust game, partial transfers are difficult to interpret: Does a trustor who sends half his endowment trust halfway, or does he distrust halfway? More importantly, how would such a person decide if she were forced to choose either full trust or full distrust? Because the binary trust game allows only for all-or-nothing decisions and thus eliminates the problem of partial transfers, it is arguably easier to interpret and has found widespread use (e.g., Bohnet, & Zeckhauser, 2004; Dunning, & Fetchenhauer, 2010, Eckel, & Wilson, 2004; Fetchenhauer, & Dunning, 2009, 2010, 2012; Snijders, & Keren, 2001).

#### **4.2.1 Method**

##### **4.2.1.1 Sample**

A total of 140 participants agreed to participate in a survey on personality assessment during an introductory psychology lecture for undergraduate students of the social sciences at a large German university. Three participants were excluded from further analyses because they failed to correctly answer at least one out of six control questions regarding the monetary outcomes of the trust game. The remaining sample of 137 persons comprised 92 (67.2%) females and 45 (32.8%) males aged between 18 and 31 years ( $M = 23.20$ ,  $SD = 2.47$ ).

#### 4.2.1.2 Procedure

First, all subjects learned about the general features and consequences of the one-shot binary trust game described above. The language used was as neutral as possible, i.e., we avoided words such as “trustor”, “trustee”, “trusting”, etc., and used terms such as “Person A”, “Person B”, “sending”, etc. instead. Thereafter, participants answered six control questions concerning the potential monetary outcomes for Persons A and B.

Second, participants were told that they were about to assess several characteristics of a person who had participated in the previously illustrated game in the role of Person A (i.e., the trustor). In a between-subjects experimental design, we manipulated two factors:

*Target’s trust decision.* Participants were told either that Person A had kept the €5 for herself (i.e., distrusted) or that she had send the €5 to Person B (i.e., trusted). However, in the latter case, participants were not informed about the outcome of the interaction, i.e., they did not know whether Person B had reciprocated or defected.

*Target’s sex.* Half of the participants were informed that Person A was female, and the other half were informed that Person A was male. However, because this factor did not yield any effects on perceptions of warmth and competence, it will not be further addressed.

After the manipulation, subjects assessed to what extent a number of preselected traits applied to the hypothetical Person A described previously. All ratings were captured on seven-point Likert-type scales ranging from “does not apply at all” to “fully applies”. The items “Person A is pleasant”, “...friendly”, and “...amiable” were averaged to build an integrated measure of warmth ( $\alpha = .94$ ). The items “Person A is intelligent”, “...competent”, and “...educated” were averaged to form a competence scale ( $\alpha = .83$ ).

After the rating of traits, participants indicated how they would decide in the role of Person A if they were in a similar situation (*rater’s trust decision*). Finally, all participants answered some questions con-

cerning their basic sociodemographic data and were thanked and dismissed.

#### 4.2.2 Results

Overall, 24.1% of the raters indicated that they would not have trusted in a similar situation, whereas 75.9% claimed that they would have sent their endowment to an unknown Person B. Raters' own hypothetical trust decisions were not contingent upon the target's alleged decisions, implying that raters did not unreflectingly follow the target's example,  $\chi^2(1, N = 137) = 1.87, p = .23$ . Because the rater's hypothetical decision and the target's alleged decision were unrelated, they could both be utilized as explanatory variables in a set of two-way ANOVAs with perceptions of warmth and of competence as the respective dependent variables.

There was a significant overlap between judgments of warmth and of competence ( $r = .51, p < .001$ ) if the target decided to trust, but no significant correlation ( $r = -.05, p = .72$ ) if the target decided to distrust (*Fisher-Z* = 3.48,  $p < .001$ ).

##### 4.2.2.1 Warmth

To investigate the effects of trust and social projection on perceptions of warmth, we used a two-way ANOVA with ratings of warmth as the dependent variable and the target's and rater's trust decisions as the explanatory variables.

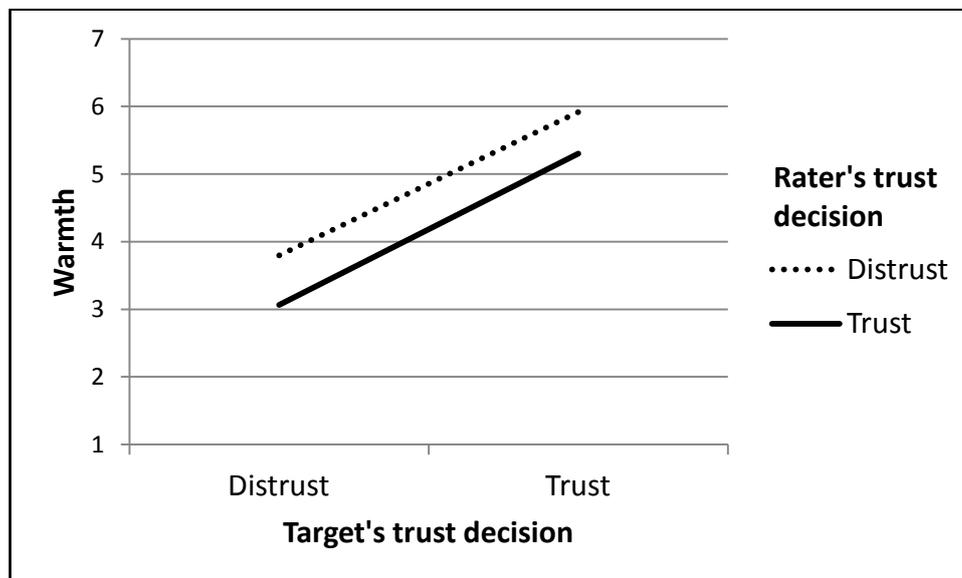
The target's trust decision had a significant main effect on ratings of warmth,  $F(1, 133) = 82.52, p < .001$ . This means that targets who decided to send the €5 to Person B (i.e., who trusted) were evaluated more favorably in terms of warmth ( $M = 5.42, SD = 1.25$ ) than were those who kept their endowment ( $M = 3.27, SD = 1.14$ ).

The raters' own hypothetical trust decisions had a significant main effect on perceptions of warmth,  $F(1, 133) = 7.85, p < .01$ . This means that raters who would have trusted if they had been in the same situation as the target were on average less generous in their ratings of

warmth ( $M = 4.18$ ,  $SD = 1.67$ ) than were those who would not have trusted ( $M = 4.57$ ,  $SD = 1.36$ ).

Finally, there was no interaction between target's trust decision and rater's trust decision,  $F(1, 133) = 0.06$ ,  $p = .81$ . This means that even raters who would not have trusted were likely to perceive trustful targets to be more pleasant, friendly, and amiable than distrustful targets (see Figure 5). Likewise, raters who would have trusted in a similar situation were less generous in their judgments of warmth regardless of whether the respective target had decided to trust or to distrust.

**Figure 5: Ratings of warmth as a function of the target's stated and the rater's hypothetical trust decisions**



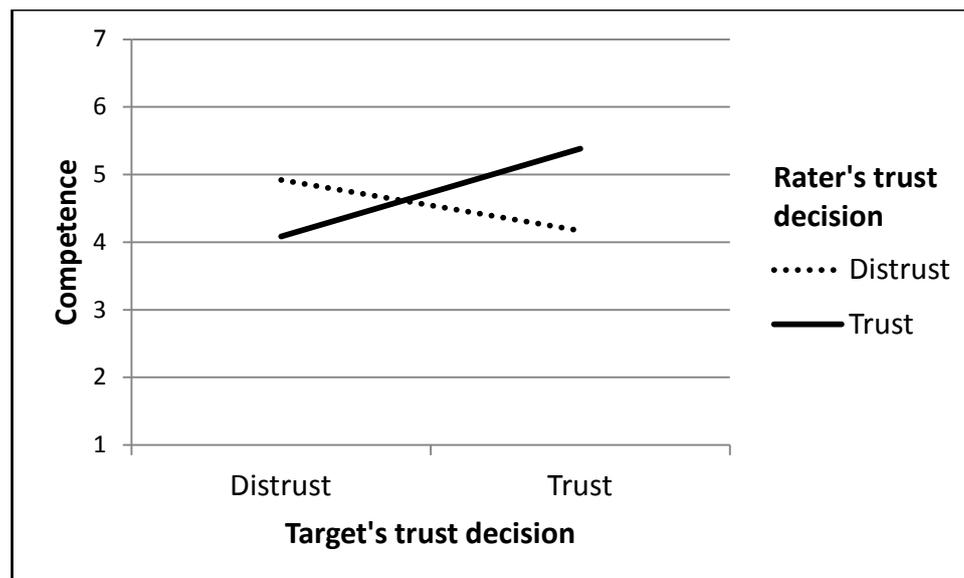
#### 4.2.2.2 Competence

We explored the effects of trust and social projection on perceptions of competence using a two-way ANOVA with ratings of competence as the dependent variable and the target's and rater's trust decisions as the explanatory variables.

Neither the target's trust decision ( $F(1, 133) = 2.21$ ,  $p = .14$ ) nor the rater's own decision ( $F(1, 133) = 1.07$ ,  $p = .30$ ) had main effects on ratings of competence. However, there was a significant interaction between the target's decision and the rater's decision,  $F(1, 133) = 31.11$ ,  $p < .001$ . Bonferroni-corrected multiple comparisons revealed that dis-

trustful targets obtained higher ratings of competence from distrustful raters than they did from trustful raters ( $p < .001$ ), whereas trustful targets were judged more favorably by trustful than by distrustful raters ( $p < .001$ ). Moreover, the moderating effect of social projection was so pronounced that trustful raters actually judged trustful targets to be significantly ( $p < .001$ ) more competent ( $M = 5.38$ ,  $SD = 0.82$ ) than they judged distrustful targets ( $M = 4.08$ ,  $SD = 0.98$ ), whereas distrustful raters judged trustful targets to be significantly ( $p < .05$ ) less competent ( $M = 4.17$ ,  $SD = 0.94$ ) than they judged distrustful targets ( $M = 4.92$ ,  $SD = 0.82$ ) to be (see Figure 6).

**Figure 6: Ratings of competence as a function of the target's stated and the rater's hypothetical trust decisions**



#### 4.2.3 Discussion

The results indicate that behavior in the trust game served as a basis for trait inferences concerning both warmth and competence. Our measures of warmth and competence exhibited a positive correlation, but only if targets behaved distrustfully. This means that distrustful targets were often perceived to be as incompetent as they were cold, whereas judgments of trustful targets appeared to be more differentiated in terms of warmth and competence. In other words: a so-called “halo” effect, which has often been observed with regard to isolated judg-

ments of individual targets (e.g., Judd, James-Hawkins, Yzerbyt, Kashima, 2005; Rosenberg, Nelson, & Vivekananthan, 1968), only emerged with regard to the evaluation of distrustful rather than trustful targets.

The structure of the effects differed notably for warmth and competence. On the one hand, regarding warmth, our results were in accordance with previous findings by Krueger et al. (2008), indicating that trustful targets obtained higher ratings of warmth than did distrustful targets regardless of the rater's own hypothetical decision. On the other hand, regarding competence, we found a strong interaction between the target's decision and the rater's own hypothetical decision. Raters who would have trusted in a similar situation rated trustful targets to be considerably more competent than distrustful targets. However, distrustful raters rated trustful targets to be less competent than distrustful targets.

The results of Study 1 lead to the notion that social projection actually has a bearing on social judgment, but only in the domain of perceived competence and not in that of warmth. Overall, given the circumstance that most raters (75.9%) would themselves have trusted, the reputational consequences of trustful behavior seem to be extraordinarily positive.

However, social projection is not the only source of potential bias. Specifically, the social perception of trust may be subject not only to the effects of social projection but also to the actual outcomes of trustful or distrustful behavior. We will refer to this as *consequentialism*.

### **4.3 Study 2**

Whereas social projection might partially reflect the *anticipated* consequences of trust, consequentialism pertains to the question of whether the inferences drawn from trustful (and distrustful) behavior are subject to the *actual* consequences of trust, i.e., whether trust is (or would be) rewarded or exploited by the trustee. On the one hand, traits inferred from trust behavior may account only for the act of trusting vs.

distrusting, which would be indicative of a deontological style of social judgment. On the other hand, however, observers may base their judgments on the consequences of trusting vs. distrusting, which would speak for a consequentialist style of social judgment.

In their seminal article on outcome bias, Baron and Hershey (1988) demonstrated that people tend to rate thinking as better and decision makers as more competent when the outcome of a financial decision is favorable than when it is unfavorable, even if they were explicitly told to ignore the outcome. Outcome-based judgments of decisions and decision makers do not only occur in the domain of financial decision making and not only with regard to perceptions of competence; they also pertain to the evaluation of moral decisions (Gino, Shu, & Bazerman, 2010; Lipshitz, 1989; Lipshitz, & Barak, 1995). However, studies using cognitive load manipulations showed that quick and intuitive judgments of morality appear to be deontological rather than consequentialist (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008).

It has been shown that individuals' trust decisions are predicted only by how they feel about the act of trusting or distrusting and not by how they feel about the potential consequences of doing the one or the other (Dunning, & Fetchenhauer, 2010; Dunning et al., 2012). Similarly, people place substantial trust in their peers, even when the odds of reciprocation are low (Fetchenhauer, & Dunning, 2012) and even though many trustors expect to be betrayed (Fetchenhauer, & Dunning, 2009). This all leads to the notion that individual trust decisions do not follow a consequentialist logic (Dunning et al., 2012; Dunning, & Fetchenhauer, 2010). However, it remains to be examined whether the social perception of these decisions is equally non-consequentialist. Therefore, Study 2 accounted for the potential effects of consequentialism.

Study 1 provided us with insights on how trust behavior shapes the two basic dimensions of social judgment, namely, perceptions of warmth and of competence. However, it still remains to be answered how these perceptions translate into global evaluations of personality.

Previous research suggests that judgments of warmth usually precede judgments of competence (Cuddy et al., 2011; Fiske et al., 2007) and that others' behavior is construed more frequently in terms of warmth rather than in terms of competence (Wojciszke, 1994, 2005). Similarly, perceived warmth has a larger impact on behavioral and affective responses and appears to be a stronger predictor of global evaluations of others' character than are judgments of competence (Wojciszke, 2005). In other words, judgments of warmth dominate social perception (Wojciszke, 2005), which is, however, not to say that perceived competence would not have any bearing on global evaluations. Therefore, in Study 2 we explored how trust and distrust affected global judgments of others' personalities.

Furthermore, the rating procedure employed in Study 1 may have caused effects of experimenter demand (Orne, 1962). In particular, by providing raters with specific traits referring to either warmth or competence, we may have inadvertently primed the salience of these two dimensions and thus prompted raters to think about the traits in question and to construe targets' behavior with respect to these terms.

Thus, we provided raters with the opportunity to freely associate personality traits of their own choice in Study 2. Subsequently, we examined how the resulting personality profiles were perceived with regard to global evaluations of personality. This elaborate rating procedure served to reduce potential effects of experimenter demand and to facilitate free and unbiased trait inferences.

#### **4.3.1 Method**

In Phase 1, participants freely ascribed personality traits of their own choice to trustful or distrustful targets. To account for the potential effects of consequentialism, we systematically manipulated information on the outcomes of the trust or distrust decisions, i.e., whether trust or distrust turned out to be warranted or unwarranted. In Phase 2, the resulting trait profiles were rated along the dimension of overall valence

by a second set of raters who were unaware of the targets' original trust decisions and their consequences.

#### **4.3.1.1 Phase 1: Attribution of traits**

##### **4.3.1.1.1 Sample**

A total of 200 participants were recruited for a study on personality assessment during an introductory psychology lecture for undergraduate students of the social sciences on the campus of a large German university. Sixteen participants were excluded from further analyses because they failed to correctly answer at least one out of eight control questions regarding the features and monetary outcomes of a binary trust game. Two participants were excluded because they failed to understand what we meant with the term "traits" and listed emotions or cognitions instead. The remaining sample of 182 persons comprised 98 (53.8%) females and 84 (46.2%) males aged between 18 and 36 years ( $M = 23.73$ ,  $SD = 3.13$ ). Three randomly selected participants were awarded with cash prizes of €150, €100, and €50, respectively.

##### **4.3.1.1.2 Procedure**

Subjects first learned about the general features and consequences of a one-shot binary trust game involving the same properties and payoff structure as in Study 1. Thereafter, participants answered six control questions concerning the potential monetary outcomes for Person A (the trustor) and Person B (the trustee).

Subsequently, we independently manipulated two factors in a 2x3 between-subjects experimental design, leading to a total of six conditions with 29 to 32 valid cases per condition.

*Target's trust decision.* Similar to Study 1, participants were told that Person A had either kept the €5 (i.e., distrusted) or sent the €5 to Person B (i.e., trusted).

*Feedback.* We systematically manipulated information on Person B's trustworthiness independent of Person A's previously stated decision. As a baseline condition, we provided no feedback at all. In the second condition, we provided negative feedback on Person B's trustwor-

thiness, i.e., it was stated that the trustee had (or would have) kept the whole €20 and sent nothing back to the trustor. In the third condition, we provided positive feedback, meaning that the trustee had (or would have) split the €20 equally and sent €10 back to the trustor.

Because the experimental design was somewhat more complex than that of Study 1, we implemented two additional multiple-choice control questions immediately after the manipulation. This allowed us to ensure that all participants in the final sample understood whether Person A had decided to trust or not to trust, whether Person B had (or would have) reciprocated or defected, or whether there was no information on the trustee's decision.

Participants were told that they were about to evaluate the personality of an unknown person who had participated in the trust game described above in the role of Person A. Specifically, they were asked to freely list five personality traits they would attribute to Person A, given her decision in the trust game. Thereafter, participants indicated how they would decide in the role of Person A if they were in a similar situation. Finally, participants answered some questions concerning their basic sociodemographic data and were thanked and dismissed.

#### **4.3.1.2 Phase 2: Rating of trait profiles**

##### **4.3.1.2.1 Sample**

A total of 64 participants were recruited for a study on personality assessment on the campus of a large German university. The sample comprised 31 (48.4%) females and 33 (51.6%) males aged between 19 and 33 years ( $M = 23.59$ ,  $SD = 2.66$ ). Thirteen randomly selected participants were awarded cash prizes ranging from €10 to €100.

##### **4.3.1.2.2 Procedure**

The traits freely associated by participants in Phase 1 were corrected for spelling errors and retyped to build experimental vignettes. For each vignette, traits were arranged in the same order as provided by the raters in Phase 1. The resulting 182 personality profiles were randomly

divided into three batches. Each individual rater handled one batch consisting of approximately 60 profiles.

Raters were told that each vignette would contain a short personality profile of a person with a rating scale underneath. They were asked to indicate their overall impression of a person characterized by the listed traits. All ratings were captured on seven-point Likert-type scales ranging from “very negative” to “very positive” and referring to the global evaluation of each person. As a consequence of the mixed between-/within-subjects rating procedure, each vignette was evaluated by 21 to 22 different raters. Because of the high concordance between raters within all three batches of profiles (all  $ICC > .98$ ), the ratings of each profile were averaged across raters and used as the dependent variable in the subsequent analysis.

#### **4.3.2 Results**

As a first step, five student assistants checked all associated traits for synonyms using a German thesaurus. For example, related words such as “stupid”, “dumb”, or “simple” were recoded as “dumb”, and related words such as “clever”, “smart”, or “intelligent” were recoded as “smart”. Using this method, we generated a list of 26 overarching traits, each one being mentioned by at least five different raters. For each of these traits, we defined a binary variable indicating whether the respective trait appeared within a given profile. Using a series of chi-square tests, we subsequently analyzed which traits were associated more often with trustful than with distrustful behavior and vice versa (see Table 3).

**Table 3: Inferred traits split by the target's trust decision**

<i>Trait</i>	Target's trust decision				$\chi^2$	<i>p</i>
	Keep €5 (distrust) ( <i>n</i> = 91)		Send €5 (trust) ( <i>n</i> = 91)			
	<i>n</i>	%	<i>n</i>	%		
Altruistic	0	0.0	36	39.6	44.88***	<.001
Cooperative	0	0.0	10	11.0	10.58**	<.01
Fair	0	0.0	13	14.3	14.00***	<.001
Gullible	0	0.0	35	38.5	43.33***	<.001
Nice	0	0.0	25	27.5	28.98***	<.001
Open	0	0.0	9	9.9	9.47**	<.01
Optimistic	0	0.0	22	24.2	25.03***	<.001
Risk-seeking	0	0.0	47	51.6	63.36***	<.001
Social	0	0.0	19	20.9	21.22***	<.001
Trustful	1	1.1	26	28.6	27.18***	<.001
Trustworthy	0	0.0	11	12.1	11.71***	<.001
Calculative	3	3.3	4	4.4	0.15	.70
Dumb	4	4.4	3	3.3	0.15	.70
Foresightful	3	3.3	9	9.9	3.21	.07
Self-confident	3	3.3	2	2.2	0.21	.65
Smart	8	8.8	11	12.1	0.53	.47
Distrustful	33	36.3	0	0.0	40.31***	<.001
Egoistic	63	69.2	13	14.3	56.48***	<.001
Greedy	14	15.4	2	2.2	9.87**	<.01
Insecure	5	5.5	0	0.0	5.14*	<.05
Pessimistic	9	9.9	0	0.0	9.47**	<.01
Rational	17	18.7	4	4.4	9.10**	<.01
Realistic	8	8.8	0	0.0	8.37**	<.01
Risk-averse	52	57.1	0	0.0	72.80***	<.001
Thrifty	21	23.1	0	0.0	23.74***	<.001
Unsocial	10	11.0	0	0.0	10.58**	<.01

Note. *N* = 182. Only traits mentioned by at least five different raters were considered.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

The traits inferred on the basis of trustful versus distrustful behavior differed considerably. Out of the 26 most frequently mentioned traits, eleven were associated significantly more frequently with trust, and ten were associated significantly more frequently with distrust. As Table 1 suggests, a majority of traits appeared to relate predominantly to perceptions of warmth (e.g., “altruistic”, “egoistic”, “nice”, “greedy”), whereas a minority seemed to relate to competence (e.g., “gullible”, “rational”, “realistic”). Some traits were difficult to classify in terms of either warmth or competence (e.g., “risk-seeking”, “risk-averse”).

Behavior in the trust game served as a cue for inferences concerning trust and trustworthiness on a trait level. Sending the €5 called forth inferences including “trustful” and “trustworthy”, whereas keeping the money frequently led to trait inferences such as “distrustful”. Furthermore, trustful and distrustful behaviors were often perceived in terms of risk-taking. Trustful targets were said to be “risk-seeking”, and distrustful targets were characterized as “risk-averse”.

Beyond these inferences pertaining to trust and risk, targets who sent the €5 were frequently described as “altruistic”, “cooperative”, “fair”, “nice”, “social”, “open”, and “optimistic”. However, they were also said to be “gullible”.

In contrast, targets who kept the €5 were said to be “egoistic”, “greedy”, “thrifty”, “unsocial”, “insecure”, and “pessimistic”. However, distrustful behavior also evoked arguably positive inferences such as “rational” and “realistic”.

In the following sections, we will systematically explore how trust and distrust shaped global perceptions of overall valence and whether these were moderated by social projection and consequentialism.

On average, 63.2% of raters in Phase 1 would have trusted in the same situation; 36.8% indicated that they would have kept their endowment. Raters’ own hypothetical trust decisions were dependent on neither the target’s trust decision ( $\chi^2(1, N = 182) = 0.59, p = .44$ ) nor feedback on Person B’s trustworthiness ( $\chi^2(1, N = 182) = 1.02, p = .60$ ). This means that raters did not unreflectingly follow the target’s example, nor did they factor in information on Person B’s trustworthiness. Because the rater’s hypothetical trust decision was unrelated to the target’s decision and feedback, all three variables could be utilized as explanatory variables in a three-way ANOVA with perceptions of valence as the dependent variable.

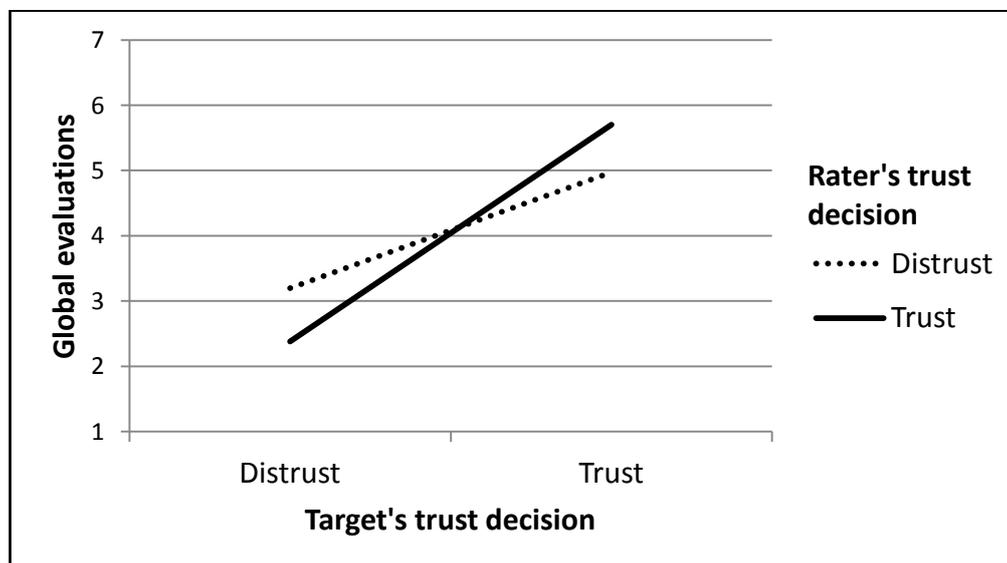
Overall perceptions of valence were subject to a significant main effect of the target’s trust decision ( $F(1, 170) = 374.40, p < .001$ ). On average, traits associated with trustful behavior were judged considerably

more positively ( $M = 5.42$ ,  $SD = 0.91$ ) than were traits associated with distrustful behavior ( $M = 2.67$ ,  $SD = 0.95$ ).

The main effect of the target's trust decision was qualified by a significant interaction between the target's decision and the rater's own hypothetical decision ( $F(1, 170) = 34.12$ ,  $p < .001$ ). Raters adjusted their trait inferences with regard to whether they would have trusted or distrusted in a similar situation (see Figure 7). Bonferroni-corrected multiple comparisons revealed that distrustful targets were perceived more favorably by distrustful ( $M = 3.23$ ,  $SD = 0.96$ ) than by trustful ( $M = 2.37$ ,  $SD = 0.80$ ) raters ( $p < .001$ ), whereas trustful targets were judged even more benevolently by trustful ( $M = 5.70$ ,  $SD = 0.56$ ) than by distrustful ( $M = 4.99$ ,  $SD = 1.15$ ) raters ( $p < .001$ ). However, these results also indicate that not only trustful but also distrustful raters perceived trustful targets considerably more benevolently compared with distrustful targets (both  $p < .001$ ).

No other effects were significant ( $0.11 < F < 2.60$ ,  $.08 < p < .74$ ). Specifically, raters solely accounted for targets' decisions to trust or to distrust and not for the consequences of these decisions. Whether trust or distrust turned out to be warranted or unwarranted played no role with regard to global evaluations of personality ( $F(2, 170) = 0.64$ ,  $p = .53$ ).

**Figure 7: Global evaluations as a function of the target's stated and the rater's hypothetical trust decisions**



### 4.3.3 Discussion

The results indicate that global evaluations of personality based on others' trust decisions were subject to social projection but not to consequentialism. Social projection affected the perception of trust with regard to both distrustful and trustful behavior. Specifically, distrustful targets were judged less negatively if raters indicated that they would also have distrusted in the same situation compared with how distrustful targets were judged if the raters would have trusted. Likewise, trustful targets received less positive judgments if raters would not have trusted compared with how trustful targets were judged if the raters would have been willing to trust. However, social projection was not powerful enough to suppress the positive main effect of trust on global evaluations. In fact, the effect size for the main effect of the target's trust decision ( $\eta^2_{\text{partial}} = .69$ ) surpassed the effect size for the interaction between the target's and the rater's trust decisions ( $\eta^2_{\text{partial}} = .17$ ) many times over. Traits associated with trustful behavior were judged more positively than were traits associated with distrustful behavior regardless of whether raters would have trusted in a similar situation.

Consequentialism played no considerable role in the social perception of trust decisions. Trustful behavior categorically called forth more positive inferences than did distrustful behavior regardless of whether trust was (or would have been) rewarded or exploited. The results suggest that people primarily judge the act of trusting or distrusting itself and not its consequences. This means that the social perception of trust and distrust followed a deontological logic rather than a consequentialist logic. In terms of reputation, trust is a winning strategy even if it is exploited rather than rewarded. At first glance, these findings appear to contradict those of previous studies concerned with the role of outcome-related information in the social judgment of financial and moral decisions (Baron, & Hershey, 1988; Gino, Shu, & Bazerman, 2010; Lipshitz, 1998; Lipshitz, & Barak, 1995). However, previous research on the determinants of trust indicates that individual trust decisions do not follow a consequentialist logic (Dunning, & Fetchenhauer, 2010; Dunning

et al., 2012; Fetchenhauer, & Dunning, 2009, 2012). Apparently, the social perception of trust decisions is similarly non-consequentialist.

#### **4.4 General discussion**

Both studies painted an overall positive picture of the social perception of trust. On average, trustful behavior conveyed considerable reputational benefits. Even though trust entails undeniable potential for ambiguity, trustful behavior was perceived positively in terms of warmth, as Study 1 demonstrated. Even though individual acts of trust may sometimes be motivated by mere self-interest, most observers judged trustfulness as a signal of morality on a trait level. Most notably, even observers who would not have trusted in a similar situation did not scrutinize other's trustfulness for selfish motives, nor did they exhibit greater understanding for distrust. Rather, trust appeared to signal good intent and evoked universally positive inferences concerning warmth, which is in accordance with previous results by Krueger et al. (2008).

With regard to competence, Study 1 showed that a large majority of observers claimed that they would have trusted in a similar situation and perceived trustful behavior as a signal of high competence. However, a minority of observers who would not have trusted perceived trustfulness as a signal of incompetence, whereas they associated distrust with competence. Apparently, there is some inherent ambiguity regarding whether trust is related to being smart or gullible, and observers' own willingness to trust determines which interpretation prevails.

How did perceptions of warmth and competence inferred from trustful or distrustful behavior translate into global evaluations of character? In accordance with previous studies indicating the primacy and prevalence of warmth in social judgment (Cuddy et al., 2011; Fiske et al., 2007; Wojciszke, 1994, 2005), we found in Study 2 that trust behavior was indeed more frequently interpreted in terms of warmth than in terms of competence. Similarly, global evaluations appeared to more closely follow the pattern for warmth than the pattern for competence

observed in Study 1 (compare Figures 5, 6, & 7). In terms of global evaluations, trustful behavior was universally judged more positively than was distrustful behavior regardless of whether observers would have trusted in a similar situation. However, Study 1 showed that social projection had a distinct bearing on judgments of competence, which may have contributed to the slight but significant effect of social projection on the global evaluations of character that we observed in Study 2. Thus, observers actually adjusted their overall impressions dependent on their own willingness to trust in a similar situation, but not fundamentally so.

Furthermore, one should keep in mind that distrustful observers were clearly a minority. It bears mentioning that the observed high willingness to trust is not an artifact of social desirability or of the hypothetical nature of raters' decisions. Compared with previous studies featuring one-shot binary anonymous trust games with real monetary incentives, the hypothetical trust rates observed in Study 1 and Study 2 did not considerably differ from previous results (e.g., Fetchenhauer, & Dunning, 2009, 2010, 2012), indicating that most people would indeed decide to trust in such a situation.

Researchers struggle to explain why people trust each other. At low odds of winning or reciprocation, people are more likely to trust than to gamble on a lottery featuring the same risks and potential payoffs (Fetchenhauer, & Dunning, 2012). Expectations of others' trustworthiness play only a minor role in trust decisions, and people systematically underestimate their peers' trustworthiness. However, many are still willing to trust, even if they should not do so given their own cynical expectations (Dufwenberg, & Gneezy, 2000; Cox, 2004; Fetchenhauer, & Dunning, 2009).

Our findings may help to explain these puzzling results by supporting the view that trust may serve as a social signal promoting a trustor's reputation as a valuable cooperation partner (Dunning et al., 2012). Trustful people appear in any case to be warm, and only in the worst case to be incompetent (i.e., in the unlikely case of being judged

by an observer who would not trust in a similar situation). Likewise, distrustful people appear in any case to be cold, and only in the best case to be competent. Therefore, and because judgments of warmth dominate person perception (Cuddy et al., 2011; Fiske et al., 2007; Wojciszke, 1994, 2005), trust is a “winning strategy” in terms of reputation.

Although trust is a double-edged sword, especially in the frame of the trust game, most people associate trustful behavior with high levels of warmth and competence, and traits inferred from behavioral trust are eminently favorable. These obvious reputational benefits are likely to transcend or offset the mere economic benefits or costs that single instances of trustful behavior may convey. After all, who would not want to be liked and respected?

## **5 Integrative discussion**

### **5.1 Key messages**

Across a total of four studies, it has become unmistakably clear that seemingly minor and isolated acts of prosociality can greatly affect the ways in which people are perceived and evaluated by their peers. In the framework of biological markets established in the introduction, performing a good deed, even as an isolated minor event, might considerably impact the market value of an individual, both as an intimate and cooperative partner.

However, doing good is not always a magic bullet. The results presented in Chapters 2 and 3 indicated that prosocial behavior strongly impacted desirability as a long-term romantic partner, but had considerably weaker effects on short-term sexual desirability. Similarly, the studies presented in Chapter 4 indicated that judgments relevant to the value of an individual as a cooperative partner were dependent on the observers' own propensity for doing good. Depending on the situation, doing good might have a strong or a negligible effect on the market value of an individual as an intimate or cooperative partner. However, it is of paramount importance to stress that doing good did never yield a negative effect. As discussed in Chapters 2 and 3, even in their short-term mate choices, neither women nor men appeared to exhibit a weakness for "bad boys" or "bad girls", at least as long as physical attractiveness was held constant. Similarly, even the detrimental effects of social projection on the competence ratings observed in Chapter 4 were rendered negligible by the large and strong positive effect on ratings of warmth. In terms of value as an intimate or cooperative partner, the first key message concerning all studies is that performing good deeds actually yields benefits most of the time and does not appear to hurt the reputation of an individual anytime.

The question of whether doing good is actually worth the cost is difficult to answer. Whereas advocates of the costly signaling theory emphasize that signals must be particularly costly to discourage imita-

tion (e.g., Gintis et al., 2001; Lotem et al., 2003; Zahavi, 1977; Zahavi, & Zahavi, 1996), throughout all studies we employed signals that did not exceed a monetary value of €5 (Chapters 2 and 4) and €10 (Chapter 3), respectively. It is highly questionable whether these minor investments conveyed a signal concerning an individual's wealth or resource-holding potential. Particularly, the freely associated traits presented in Study 2 of Chapter 4 did not indicate that trustful behavior was associated with wealth. Rather, it appears that prosocial behavior, at least in the context of low-stakes experimental games, was arguably exclusively associated with personality. Therefore, a second key message might be that doing good does not necessarily need to be particularly costly to convey important information concerning the good character of an individual. Even minor good deeds can be valuable displays of the quality of an individual as an intimate or cooperative partner.

The results reported in Chapters 2 and 3 might also pave the way for a new approach to show how multiple traits (and signals thereof) are integrated in the perception of others. Consistent with the cognitive perspective of mate choice outlined in Chapter 3 (Miller, & Todd, 1998), physical attractiveness (as a signal of health and good genes) and prosocial behavior (as a signal of a good character) interacted substantially in the context of long-term mating, leading to the notion that overall desirability was the product rather than the sum of its parts. In other words, if multiple traits are sufficiently relevant to an individual's value as a partner, these traits were not linearly integrated. Rather, the impact of each trait on overall evaluations depended on the degree of fulfillment of other traits. Possibly, the effects observed in Chapters 2 and 3 are not limited only to long-term mate choice, but pertain to other subsets of biological markets, i.e., all subsets where multiple traits of potential partners are highly relevant to reproductive fitness. Therefore, a third key message is that prosociality and signals thereof should always be regarded in the context of other traits.

## 5.2 Further implications and critical appraisal

A common weakness of previous research investigating the role of prosocial behavior in the choice of intimate and cooperation partners might be that often only focal traits or signals thereof were experimentally manipulated, while other traits were implicitly regarded as constant (e.g., Farrelly, 2011; Kelly, & Dunbar, 2001). However, this approach might generate skewed and over- or understated results regarding the relevance of these traits in focal subsets of biological markets (e.g., the mating market). Humans typically infer latent traits (e.g., morality or competence) on the basis of other, easily observable traits (e.g., physical attractiveness), as studies concerning the “what is beautiful is good” heuristic have indicated (Dion, Berscheid, & Walster, 1972; Eagly, Ashmore, Makhijani, & Longo, 1991; Feingold, 1992). Similarly, people typically categorize others and frequently fall prey to stereotypes (e.g., Macrae, & Bodenhausen, 2000). Thus, manipulating isolated traits or signals thereof likely causes subjects to (unwittingly) relate these signals or traits to other traits, which might not be the focus of the respective study. For example, prosocial behavior might be associated with chastity, attractiveness with dominance, warmth with competence, and so on. Thus, researchers should not assume that subjects interpret the signals intended to pertain to a focal trait in isolation. Rather, stereotypes and categorical thinking might lead to further inferences extending far beyond the scope of the original signals or focal traits.

Furthermore, studies using manipulations of physical attractiveness might benefit from the methods presented in Chapters 2 and 3. One must consider that stimuli differ in a multitude of dimensions other than attractiveness. Social cognition research shows that humans are quick to infer traits, such as warmth, competence, or social dominance, from the faces of others (e.g., Oosterhof, & Todorov, 2008; Todorov, Baron, & Oosterhof, 2008; Todorov, Pakashi, & Oosterhof, 2009). Moreover, according to studies using a *thin-slices* paradigm, these inferences are often accurate (e.g., Ambady, Bernieri, & Richeson, 2000; Ambady, & Rosenthal, 1992; Carney, Colvin, & Hall, 2007; Carré,

McCormick, & Mondloch, 2009; Fetchenhauer, Groothuis, & Pradel, 2010). Therefore, two stimuli differing or not differing in physical attractiveness are statistically likely to differ in a multitude of other dimensions of social perception. For example, two male stimuli with the same physical attractiveness score might differ substantially regarding perceptions of other traits, such as dominance and aggressiveness, e.g., if one is clean-shaven and the other is bearded or if their facial width-to-height ratio differs (Carré, McCormick, & Mondloch, 2009; Neave, & Shields, 2008). In consequence, many traits other than physical attractiveness are quickly inferred on the basis of physical appearance and might influence the value of an individual as a mate or cooperative partner. Therefore investigating the role of physical attractiveness is only meaningful if the experimenter provides a large randomized sample of stimuli, so that varying inferences drawn from the physical appearance of these stimuli will likely cancel each other out.

In the present research, I relied on decisions in economic games as proxies for altruism, trustworthiness, and trust. Although it is not certain whether economic games validly and appropriately measure the respective constructs (e.g., Camerer, & Fehr, 2004; Bardsley, 2008; Glaeser, Laibson, Scheinkman, Soutter, 2000), these games, to the best of my knowledge, are suitable proxies for more abstract and general moral traits and social preferences potentially underlying altruistic, trustworthy, and trustful behaviors. Previous studies have established correlations between altruism, trustworthiness, and trust (Ashraf, Bohnet, & Piankov, 2006; Evans, & Reville, 2008; Kanagaretnam, Mestelman, Nainar, & Shehata, 2009), suggesting that these traits are more or less strongly associated with some generalized propensity to perform good deeds. Indeed, the results of Chapter 4 indicate that investments in the trust game were frequently associated with altruism, trustworthiness, and fairness. Even if trust might conceptually differ from trustworthiness and altruism (e.g., Ashraf, Bohnet, & Piankov, 2006; Cox, 2004), it remains questionable whether outside observers actually differentiate between these concepts. The observers likely

framed the behavior of the targets into general categories of morally good or bad. Future research must clarify whether these behaviors and the underlying traits are clearly distinguished in social perception.

In addition, I would like to address some concerns regarding the value of prosocial behavior as a sexual or social signal. I have repeatedly stressed that “doing good does you good”, i.e., that third parties perceive prosocial behavior as a signal revealing an individual’s good character. I concluded that in many subsets of biological markets, and under most circumstances, prosocial behavior exerts a positive influence on the market value of an individual, e.g., as a romantic or cooperative partner. However, prosocial behavior might sometimes be strategically motivated and guided through a desire to burnish one’s image (Olson, 1965; Becker, 1974). Awareness of this fact might lead observers to a complete or partial devaluation of prosocial behavior as a signal of good character. Similarly, a signal might be more powerful if the chance of being observed is low rather than high, as the signal would consequently lack the potential for strategic motivation. People might intuitively appraise selfless behavior more when the target person is faced with a strong temptation to behave selfishly due to the privacy of the situation. This notion might also explain why not *all* people behave exceedingly prosocial under conditions of high publicity (Bereczkei, Birkas, & Kerekes, 2007, 2010; Birkas, Bereczkei, Kerekes, 2006; Hardy, & Van Vugt, 2006), and not *all* people behave exceedingly selfishly under conditions of high privacy (Eckel, & Grossman, 1996; Forsythe, Horowitz, Savin, & Sefton, 1994; Hoffman, McCabe, Shachat, & Smith, 1994; Hoffman, McCabe, & Smith, 1996). The higher the probability of observation, the less valuable the prosociality signal might be; conversely, the lower the probability of observation, the more valuable the prosociality signal might be. This idea might explain why prosociality is not a perfect correlate of publicity, as a lower chance of recognition might (at least partially) be compensated by a higher chance of appraisal if the signal is recognized anyway.

Furthermore, prosocial behavior might not reflect good character if it is enforced by strong social norms. In such situations, individuals might not receive special praise if they abide to the norm, but rather lose face if they fail to follow the norm. In this context, it is reasonable to differentiate between descriptive and injunctive social norms (Cialdini, 2012; Cialdini, Reno, & Kallgren, 1990). While *injunctive norms* refer to “what others approve”, *descriptive norms* denote “what others do” (Cialdini et al, 1990, p. 1015). Regarding a given behavior, injunctive and descriptive norms might be considerably different. For example, a majority of people might approve of donating blood (injunctive norm), but only a minority actually donate blood (descriptive norm). I would argue that the impact of prosocial behavior as a social and sexual signal is strongest when injunctive norms are strong, and descriptive norms are weak, i.e., when most people would approve of a behavior but only few people would actually behave in such a way. This notion might also lead to a re-evaluation of the second key message, namely that prosocial behavior does not necessarily need to be costly. In the framework of injunctive and descriptive social norms, it seems reasonable that costly prosocial behavior would receive more praise than less costly prosocial behavior, as costly prosocial acts will arguably be less prescribed through descriptive norms. For example, most people would approve of offering one’s seat to a handicapped person on a crowded bus, just as most people would approve of rescuing a drowning child from a wild current. However, while many people would offer their seat on the bus, considerably fewer people would jump into the icy water, rendering the descriptive norm much weaker in the latter example. This rationale might also explain previous findings indicating that displays of altruism combined with bravery have considerably stronger effects on the desirability of males than displays of altruism without bravery (Kelly, & Dunbar, 2001), as bravery is very costly and only few men are brave.

Moreover, it remains to be discussed whether the effects of prosocial behavior as sexual and social signals in biological markets can

provide a reasonable explanation for the evolution of human prosociality. I propose that there is no single workable theory with respect to all instances of human prosocial behavior. The inclusive fitness theory (Dawkins, 1989; Hamilton, 1964; Williams, 1966) is a powerful tool to explain the evolution of prosociality, and this theory can be applied to a wide range of prosocial behaviors where actors and recipients are genetically related (West et al., 2011). Similarly, the theory of reciprocal altruism (Axelrod, & Hamilton, 1981; Cosmides, & Tooby, 1992; Trivers, 1971) is perfectly applicable to prosocial behaviors that allow repeated interactions between two parties. However, the idea of biological markets that foster competition for the most valuable partners via signaling the market value of an individual (Barclay, 2013; Noë, & Hammerstein, 1994, 1995) might serve as a promising and suitable approach in many cases where classic explanations fall short.

## **6 Directions for future research**

In the following sections, I will delineate some ideas for future research, building upon and transcending the theoretical foundations and empirical work presented in the previous chapters. One unifying theoretical consideration underlying the following research ideas is that humans populate biological markets, where they strive to identify and compete for access to the most desirable intimate and cooperation partners.

### **6.1 Traits in context: How and why physical attractiveness and prosocial behavior jointly shape perceptions of desirability**

The results presented in Chapters 2 and 3 provide empirical support for the idea that cues for important fitness-relevant traits in a potential mate are not integrated in a linear, additive way, but rather interact non-linearly to shape global perceptions of desirability (Miller, & Todd, 1998). In long-term mating, where both physical attractiveness (as a signal of health and good genes) and prosocial behavior (as a signal of a good character) are highly relevant, the impact of displays of prosocial behavior on the ratings of desirability was dependent on the physical attractiveness of the potential partners and vice versa. This observation suggested that kindness played a larger role if the potential partner was attractive rather than unattractive, and that attractiveness had a larger influence if the potential partner was kind rather than unkind. From a theoretical perspective, this idea makes sense, as it would not be adaptive for excess with regard to one trait to perfectly substitute for the complete lack of another (Miller, & Todd, 1998). The data obtained in Chapters 2 and 3 is consistent with these considerations. However, there might be alternative explanations for the observed effects.

First, judgments of attractiveness appear to be strongly correlated with judgments of trustworthiness (Todorov, Baron, & Oosterhof, 2008), ascribed to the so-called “what is beautiful is good” heuristic (Dion, Berscheid, & Walster, 1972). Therefore, exposure to physically attractive

stimuli may evoke implicit expectations of moral behavior. In natural environments, information on physical appearance is typically expected to precede information on pro- or antisocial behavior. Thus, strong expectations of moral behavior, derived from the physical attractiveness of others, might lead to a “beauty premium”; i.e., in case of doubt, attractive people might be treated as if they were moral. If attractive people adhere to these high expectations by actually behaving in a prosocial way, this adherence might not necessarily boost their desirability even further. However, if attractive people fail to live up to the high expectations of others, these individuals might experience a considerable “beauty penalty”, expressed as a withdrawal of the advanced premium. According to Wilson and Eckel (2006), attractive trustees are indeed viewed as more trustworthy and consequently given a beauty premium, i.e., they are trusted more often. However, attractive trustors are also expected to behave more trustfully than unattractive trustors and undergo a beauty penalty if they fail to satisfy the trustees’ high expectations, i.e., they receive less in return compared with unattractive trustors, who are expected to be less trustful (Wilson, & Eckel, 2006). If such a beauty penalty, resulting from the violation of the high expectations of others, is the driving force behind the effects observed in Chapters 2 and 3, attractive people should not necessarily benefit more from behaving in a prosocial way than less attractive people, but these individuals might receive more condemnation following antisocial behavior.

Second, facial attractiveness in males has been shown to be a predictor for defective behavior across four different experimental games (although this was not the case for females) (Takahashi, Yamagishi, Tanida, Kiyonari, & Kanazawa, 2006). Similarly, higher fluctuating asymmetry in males and higher body mass index in females (which are both important predictors for attractiveness in males and females, respectively; see Cornelissen, Toveé, & Bateson, 2009; Gangestad, Thornhill, & Yeo, 1994) have been associated with lower offers in the ultimatum game (Zaatari, & Trivers, 2007). In the light of Gangestad and Simpson’s (2000) theory of strategic pluralism, one might assume

that highly attractive people simply do not have to be prosocial and kind to succeed in mating, and often moral behavior might merely be an effort to compensate for a lack of attractiveness. Therefore, those who do not really need to be moral (i.e., highly attractive people) might receive even more praise for behaving morally than those who need to be moral to succeed in mating (i.e., less attractive people). If this is the case, then one may expect attractive people to receive more praise for prosocial behavior compared with unattractive people, but not necessarily more condemnation for antisocial behavior.

The validity of these explanations might be investigated in a more refined experimental design, building on the experiment employed in Chapter 3. In a first step, one might record short video clips of female and male targets with various levels of physical attractiveness. In a second step, these videos would be presented to raters of the opposite sex. Each video would be presented twice to each rater. After the first passage, the raters would judge the respective target's physical attractiveness and estimate how the target would decide as a trustee in a one-shot binary trust game featuring the same properties as employed in Chapter 3. Judgments of physical attractiveness and expectations of trustworthiness could be captured on Likert-type scales with probability ratings for the latter. Subsequently, the video would be shown for a second time with information on the target's alleged decision displayed on screen. The information should be varied between subjects and allow for a "no information" condition, suggesting that each target would be presented as either trustworthy, untrustworthy, or no information on the target's actual decision would be displayed. After the second passage, the raters would judge the target's desirability as a long-term intimate partner.

In the subsequent analysis it would be possible to assess how perceptions of physical attractiveness are associated with expectations of trustworthiness. More importantly, one might obtain insight on how information on the target's alleged behavior (either consistent or inconsistent with the stated expectations) influences desirability ratings com-

pared with the no-information treatment, where raters can be expected to solely rely on judgments of physical attractiveness and expectations of the target's trustworthiness. Specifically, one might examine whether attractive targets (as compared to less attractive targets) actually benefit more from behaving in a trustworthy way, or whether these individuals lose more from behaving in an untrustworthy way, or both.

A more elaborate variant of this experimental design might also allow for targets to make an actual decision as trustees after the recording of the videos. This experiment might answer the question of whether attractiveness is associated with actual moral behavior and potentially replicate the finding that humans validly identify the moral dispositions of others, even after short exposure, as a recent study using a thin-slices paradigm suggests (Fetchenhauer, Groothuis, & Pradel, 2010).

## **6.2 Doing good as social signal: How social norms, publicity, and costs of doing good influence the signaling value of social behaviors**

In the previous chapter (5.2) I discussed the idea that the positive or negative value of social behaviors (i.e., "behaviors which have a fitness consequence for both the actor and the recipient", West et al., 2011, p. 232) as sexual and social signals in biological markets might be subject to at least four factors: the *injunctive norm* pertaining to the situation (i.e., "what others approve"), the *descriptive norm* (i.e., "what others do"), *publicity* (i.e., the probability of being observed), and the *cost of doing good* (compared with behaving selfishly).

Whether social behaviors generally qualify as positive or negative signals concerning the moral character of the actor should depend on injunctive norms pertaining to the respective behaviors, i.e., social behaviors approved by others might have potential to be positive signals, and social behaviors disapproved by others are potentially negative signals. However, the magnitude of potentially positive or negative signals should be contingent on the respective descriptive norms, publicity, and costs of prosocial versus selfish behavior.

If there is only a weak descriptive norm to do good, i.e., if only few people engage in prosocial behavior, it can be assumed that prosocial behavior will be met with more praise, but selfish behavior will also be regarded with less contempt than if there is a strong descriptive norm to do good.

If prosocial behavior is likely to be observed by others and therefore has great potential to be used as a strategic signal, then this behavior might be devaluated as a signal of a good character. However, selfish behavior might be perceived as even more impertinent and outrageous if it occurs in broad daylight and under the watchful eyes of others than if it is unlikely to be discovered.

If doing good is costly compared with behaving selfishly, prosocial behavior might be valued more strongly as signal of good character than if doing good is less costly. However, observers might also be more sympathetic about selfish behavior if behaving in a prosocial manner is extremely costly to the actor.

Thus, I argue that prosocial behavior (i.e., behavior that others approve of) will be highly valued if only few others would do the same, if it yields little potential for observation by others, and if it is costly to the actor. The signaling value of performing good deeds will be least if many others would do the same, if these acts are public and therefore bear great potential for being observed and yield little costs to the actor.

Similarly, selfish behavior (i.e., behavior that others do not approve of) would provoke the greatest moral outrage if most others would likely do otherwise, if this behavior was performed in public and doing the right thing would cost little. However, selfish behavior will be most forgivable if only few would do otherwise, if this behavior was not public and doing the right thing would be very costly.

The joint influence of the above-mentioned factors might be experimentally investigated using the decisions of trustees in a one-shot binary trust game featuring the same properties and payoff structure as described in Chapters 3 and 4, serving as the respective social behaviors. As reported in Chapter 3, the behavior of the trustees is subject to

moral judgment. There is a strong injunctive norm prescribing trustworthy behavior, whereas untrustworthy behavior is despised and punished (Bicchieri, Xiao, & Muldoon, 2011; Charness, Cobo-Reyes, & Jiménez, 2008).

Using a between-subjects experimental design, one might therefore experimentally manipulate information concerning the decisions of the targets as trustees in a binary trust game (adherence to injunctive norm), the prevalence of the respective behavior among a hypothetical reference group (descriptive norm), whether the decision was made in public or in private (publicity), and how much money was at stake (costs). In a first experiment, all variables could be operationalized as binary variables to build a total of 16 experimental vignettes. To manipulate adherence to the injunctive norm and perceptions of costs, the vignettes might either state that “Person B decided to keep €100 (/€10) and to return €100 (/€10) to Person A”, for trustworthy targets, or that “Person B decided to keep €200 (/€20) and to return €0 to Person A”, for untrustworthy targets. To manipulate the relevant descriptive norm, the vignettes could state that “out of 100 participants assigned to the role of Person B, 80 (/20) did likewise”. To manipulate publicity, the vignettes might claim that “Person B was made aware (/kept unaware) of the fact that that his decision would be communicated to others who would subsequently evaluate his character based on that decision”.

The judgments of the target’s personality might be captured using free associations (such as in Study 2 of Chapter 4) and closed scales pertaining to different favorable (or unfavorable) personality traits (such as in Study 1 of Chapter 4). Furthermore, raters might provide overall judgments concerning the desirability of the targets as short- and long-term intimate partners, cooperative partners or friends.

### **6.3 Good in some respects, bad in every way? Halo effects in person perception**

In Study 1 of Chapter 4, I reported a considerable positive correlation between judgments of warmth and competence, but only follow-

ing displays of distrust, suggesting that observers perceived distrustful targets as incompetent and cold, whereas observers arrived at more differentiated perceptions following displays of trust. Comprehensive research in the domain of social judgment implies that perceptions of warmth and competence are often positively associated when judging individual targets or behaviors, as compared to judgments of multiple targets or social groups (e.g., Cuddy, Glick, & Beninger, 2011; Judd, James-Hawkins, Yzerbyt, Kashima, 2005). However, the results presented in Study 1 of Chapter 4 suggest that this so-called “halo effect” (Rosenberg, Nelson, & Vivekananthan, 1968) might be particularly pronounced with regard to the perception of persons exhibiting immoral or antisocial behaviors. In short, morally bad people might often be judged as equally dumb, whereas morally good people might not necessarily be judged as equally smart. People often use themselves as (implicit) standards in social judgment (Dunning, & Hayes, 1996) and strive to judge themselves as superior to others, particularly in terms of morality (Alicke, & Govorun, 2005; Gilovich, Epley, & Hanko, 2005). As a result, judgments of immorality might quickly spill over to judgments of incompetence following the moral transgressions of others. However, the morally righteous behavior of others might be appreciated as such, but it might be far less likely to unreflectingly spill over to judgments of competence. Rather, moral behavior might be thoroughly scrutinized for signs of incompetence to attain self-serving compensation for the praise of the morality of others.

One test of this hypothesis might be conducted in the course of the study described in Chapter 6.2 by considering trait inferences pertaining not only to warmth but also to competence (such as in Study 1 of Chapter 4) and comparing the correlations between perceived warmth and competence with regard to whether the respective inferences followed accounts of moral or immoral behavior.

#### 6.4 Social meta-judgment: Judging how others judge you

In general, people might behave immorally because they either misjudge or underestimate the impact of their moral transgressions on the impressions of others or simply do not care about the impressions of others, e.g., because they believe to be anonymous or independent of the favor of other people. From an evolutionary point of view, I argue that most moral transgressors belong to the latter category, i.e., that most transgressors simply do not care.

However, some advocates of the classic *attribution theory* might likely argue otherwise. *Actor-observer asymmetry* (Jones, & Nisbett, 1972; for a meta-analysis, see Malle, 2006) denotes the human tendency to explain one's own behavior in situational terms, while explaining the behavior of others on the basis of stable dispositions. *Self-serving bias* (Heidler, 1958; for a review, see Campbell, & Sedikides, 1999) denotes the tendency to explain outcomes that favor the self on the basis of internal attributions (e.g., diligence), while explaining outcomes that disfavor the self on the basis of external attributions (e.g., bad luck). These two classic theories lead to the prediction that people perceive the moral transgressions of others as a telltale sign of a bad character, while explaining one's own moral transgressions as a result of situational factors and not as signals of moral depravity. However, while self-serving in the short-run, this tendency might prove extremely maladaptive in terms of evolutionary fitness. As ample research on the *negativity bias* in impression formation indicates (for reviews, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Rozin, & Royzman, 2001), in the eyes of others, morally bad behaviors are more diagnostic of a morally bad character than morally good behaviors are indicative of a morally good character (Skowronski, & Carlston, 1989). This observation reflects the need for an individual to behave in a morally righteous way at all times to be considered truly moral, whereas an immoral person might sometimes deviate from immoral behavior but still be considered truly immoral (Skowronski, & Carlston, 1992). Therefore, if people failed to understand the devastating impact of their moral transgressions on

the impressions of others, then people would not be able to successfully advertise their value as partners in biological markets. Thus, from an evolutionary point of view, humans should be proficient in validly assessing how observers evaluate moral transgressions. The cognitive ability to form valid inferences concerning the reputational costs (or benefits) of antisocial (or prosocial) acts can be considered a key prerequisite in biological markets. In the light of *error management theory* (Haselton, & Buss, 2000), people might possibly even overestimate the negative impact of their immoral behavior on the perceptions of others to avoid irrevocably ruining their reputation.

Therefore, it is highly unlikely that individuals possessing an unimpaired theory of mind (i.e., the cognitive capacity to attribute perceptions, opinions, or attitudes to other people; Premack, & Woodruff, 1978; Baron-Cohen, 1995) would systematically underestimate the impact of their moral transgressions on the impressions of others.

The first test of this hypothesis might take place within the context of the binary trust game presented in Chapters 3 and 4. Following an initial investment by an unknown trustor (Person A), participants in the role of the trustee (Person B) would be free to reward the trust by returning half of the multiplied amount to the trustor or exploit the trust by keeping the whole amount and returning nothing to the trustor. Immediately after the decision, each participant would be asked to indicate how others would judge his character if they learned about his decision. The dependent variables might be similar to those described in Chapter 6.2 and should encompass a wide range of personality traits pertaining to warmth and competence and to overall judgments of desirability as a short- and long-term intimate partner, cooperative partner or friend. In a second phase, another group of participants might be asked to evaluate the personality of an unknown trustee along the same dimensions, while considering whether the trustee behaved in a trustworthy or untrustworthy way. The ratings provided from the perspective of the trustee and the observer could subsequently be compared along multiple dimensions to assess whether individuals mis-

judge or underestimate the impact of their decisions on the impressions of others or whether individuals correctly predict the judgments of others.

In a variation of this study, half of the participants in the role of the trustee might reflect on the perceptions of others, even before actually making decisions. There is good reason to believe that even merely thinking about the reputational consequences of moral and immoral behavior (without actually having to face public opinion) might make trustees shy away from behaving in an immoral way, due to the increased salience of the potential negative reputational consequences conveyed.

## 7 Closing words

During the course of the last three years, I learned to take delight in finding the little blank spots next to and in between the big questions that wiser women and men asked and answered before me. I also painfully learned that asking is easier than answering, and that each question that I answered would generate ten new questions that haunted and taunted me.

It seems that science is a bit like trying to fill a square when all you are allowed to draw is circles, or vice versa.

With regard to human nature, I have learned to free myself from undue cynicism, have faith in humanity, and appreciate that we, as a species, have come a long way – potentially due to our capacity for doing good. I sincerely hope that I convinced you that doing good does you good, at least in the long run.

If you are good at heart, do not hesitate to show it. Rest assured that even small acts of charity, virtue, and trust in your fellow man do not remain unnoticed. Do not give in to temptation and be patient.

Start today.

*“And let us not grow weary of doing good,  
for in due season we will reap, if we do not give up.”*

Galatians 6:9 (ESV)

## 8 References

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## 9 Curriculum Vitae

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### Education

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10.2010 - Present	Postgraduate studies, University of Cologne
09.2010	Graduation, Diplom-Kaufmann (MBA equivalent)
10.2004 - 09.2010	Business Administration (Diploma), University of Cologne
06.2004	Higher education entrance qualification, Ritzefeld-Gymnasium, Stolberg (Rhld.)

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### Professional Experience and Internships

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10.2012 - Present	Research assistant, Institute of Sociology and Social Psychology, University of Cologne
10.2010 - 09.2012	Lecturer, Institute of Sociology and Social Psychology, University of Cologne
08.2008 - 10.2008	Intern, LN Metals International Ltd., London
01.2006 - 05.2007	Working student, Prym Fashion GmbH & Co. KG, Stolberg (Rhld.)
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