



# The Effect of Facial Resemblance on Cooperative Behavior in the Sharing Economy

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## ABSTRACT

In online sharing economy platforms, users often need to cooperate with strangers with minimal information. When personal photos are available on these platforms, how do users form social perceptions and consequently cooperative intention? According to the stimulus-organism-response (S-O-R) model and the kin selection theory, the authors propose that facial resemblance between two partners affects their perceptions of the cognitive trustworthiness, affective trustworthiness, attractiveness, and sociability of the partner, and that these social perceptions affect their cooperative intention. In the experiment, subjects evaluate the face of five potential partners of various levels of facial resemblance. The results support that the effect of facial resemblance on cooperative intention is mediated by social perceptions. Moreover, the transactional values and social values of the task partially moderate the effect of facial resemblance on social perceptions for female subjects. Sharing economy platforms may leverage the facial resemblance to facilitate cooperation among strangers.

## KEYWORDS

Cooperative Intention, Facial Resemblance, Kin Selection Theory, Multilevel Structural Equation Modelling, Sharing Economy, Social Perceptions

## INTRODUCTION

The term *sharing economy* refers to the peer-to-peer sharing of access to underutilized goods and services (Huang & Lee, 2022; Zhao et al., 2020). The global e-commerce market has experienced the rapid growth of the sharing economy. For instance, according to Statista, the global revenue of ride-sharing services reached \$156,176 million in 2019, and it is expected to grow 10.2% annually to reach \$230,085 million by 2023 (Dadwal et al., 2020).

Matching transaction partners is a key function of the sharing economy platforms (Einav et al., 2016). A sharing economy platform needs to match a user to a partner with whom they are comfortable interacting, even when they are strangers to each other. For transactions with personal interactions, such as sharing a ride (Wang et al., 2018), a good match requires not only the objective requirements

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of the trip but also the type of person that the co-rider is. In the sharing economy context, a good matching function should facilitate cooperative behaviors. *Cooperative behavior* refers to the intention and behavior to achieve the common goal of both parties, such as participation in an online transaction with a potential partner (Axelrod & Hamilton, 1981).

In the sharing economy, social motivation is a crucial antecedent of cooperation with strangers (Bucher et al., 2016; Shiau & Chau, 2015). In traditional e-commerce, the motivation of users is often to meet transactional needs (i.e., obtaining high product and service value). However, in the context of the sharing economy, users also pursue social value, establishing social relationships with like-minded people for mutual appreciation, a sense of belonging, and companionship (Botsman & Rogers, 2010; Tussyadiah, 2016; Zhang et al., 2019). Thus, users on the sharing economy platforms may intentionally seek the social cues of others to form their social perceptions of their potential partners. *Social perception* refers to the perceived sociopsychological traits of others. The social perceptions of others ultimately affect one's cooperative intention in the sharing economy.

Personal photos have been found to facilitate cooperative behaviors between strangers (Brand et al., 2012; Ert et al., 2016; Kim et al., 2020) and the formation of social connections (Hong et al., 2020; Oeldorf-Hirsch & Sundar, 2016). Personal photos might serve as important resources for users to form social perceptions of a stranger. When a user derives favorable social perceptions from a potential partner based on their personal photos, they might have a stronger cooperative intention. The mere presence of a personal photo can either enhance other users' trust (Bente et al., 2012; Ert et al., 2016) or reduce it (Dai et al., 2018), suggesting that the characteristics of the personal photo matter.

One important characteristic of the personal photo is the *facial resemblance* between the two partners. *Facial resemblance* is defined as the similarity of one's face to the other's based on the look of facial features (Maloney & Dal Martello, 2006). Prior studies have found that an individual considers a user profile with photos that resemble their appearance as more trustworthy and attractive (DeBruine, 2002, 2004). However, users of the sharing economy platforms may form social perceptions other than trustworthiness and attractiveness. Furthermore, just as the development of trust can be culture-dependent (Zhao et al., 2020), the formation of social perceptions based on facial resemblance can be sensitive to culture and ethnicity. Provided that most prior studies were conducted in Western cultures (DeBruine, 2002; Krupp et al., 2008), the effects of facial resemblance need to be tested in other cultural settings.

In the context of the sharing economy, this study investigates how online facial resemblance may shape users' social perceptions and lead to their cooperative intention. Specifically, this study explores the following questions.

1. How does the facial resemblance between a user and the personal photo of an online stranger affect the user's cooperative intention with the stranger through social perceptions?
2. How does the user value of the task in the sharing economy moderate the effect of the facial resemblance on the user's social perceptions? An understanding of the underlying mechanism helps to explain why the facial resemblance of two parties could be leveraged to facilitate cooperation.

This study draws on the stimulus–organism–response (S–O–R) model and the kin selection theory from the field of evolutionary psychology (Sohaib et al., 2019). This study systematically investigates the relationship between facial resemblance, social perceptions, and cooperative intention in China. The authors find that the facial resemblance of the personal photo positively affects cooperative intention through the mediation of four social perceptions, namely affective trustworthiness, cognitive trustworthiness, attraction, and sociability. Furthermore, the authors postulate that social perceptions based on facial resemblance are context dependent. The authors identify two user values of a sharing economy context, namely transactional value and social value. Transactional value refers to the degree to which users seek economic utility from a cooperation task, and social value refers to the degree to

which users seek relational utility from a cooperation task. The authors find that user values partially moderate the effect of facial resemblance on social perceptions of female subjects.

The contributions of this study are multifold. First, for practitioners, the findings of this study suggest personal photos might be used in the recommendation systems in the sharing economy platforms to facilitate cooperation by matching partners according to facial resemblance (Tchunte, 2022). Second, the authors propose and empirically verify the mediating process from facial resemblance to cooperative intention. Third, the authors propose four social perceptions that users may infer from facial resemblance, i.e., cognitive trustworthiness, emotional trustworthiness, attractiveness, and sociability. They collectively provide a more comprehensive explanation of the psychological impact of personal photos. Finally, this study is among the first to identify transactional value and social value as task factors to moderate the effect of facial resemblance on social perceptions. This contingent view extends prior studies on the main effect of facial resemblance.

The remainder of this paper is organized as follows. First, the authors review the related literature on facial resemblance, social perceptions, the S–O–R model, and the kin selection theory. Second, the authors present a theoretical model and the research hypotheses. Third, the authors present the research method and the empirical results. Finally, the authors discuss the study results and the significance of this study to theory and practice.

## LITERATURE REVIEW

### Facial Resemblance and Social Perceptions

From the social psychology perspective, users have the innate ability to evaluate the personality of others from a personal photo. Cognitive neuroscience research shows that in the human brain, the amygdala automatically, instinctively, and subconsciously categorizes faces as trustworthy or not according to facial cues (Engell et al., 2007). A face provides not only personal information such as identity, expression, gender, and race (Webster et al., 2004) but also latent personality traits such as trustworthiness (Reed et al., 2012; Rule et al., 2013), dominance (Batres et al., 2015), aggression (Carré & McCormick, 2008) and competence (Sussman et al., 2013). Such perception occurs within 100 ms of first seeing a stranger's facial photo (Todorov et al., 2009).

People form many social perceptions based on facial photos. A principal component analysis has revealed two dimensions of social perceptions: valence and dominance (Oosterhof & Todorov, 2008). *Dominance* refers to the evaluation of others' physical strength, ability, intelligence, skill, creativity, and efficacy. It conceptually corresponds to *cognitive trust* (Johnson & Grayson, 2005), which refers to the perceived capabilities and reliability of another person. *Valence* refers to the evaluation of another person's intention to harm, friendliness, sincerity, and morality. This dimension roughly corresponds to *affective trust* (Chen et al., 2014), which refers to an individual's perception of the kindness of another person. Attractiveness, as a dimension of social perceptions, has also been identified as a sub-dimension of valence (Brand et al., 2012; Oosterhof & Todorov, 2008; Sutherland et al., 2013). Similarly, sociability has been identified as a sub-dimension of valence (Oosterhof & Todorov, 2008).

Prior studies have also tested the effect of facial resemblance on various social perceptions. Table 1 summarizes the most relevant literature. For instance, in the context of political candidate evaluation, people like and give better trait ratings to the candidate who is of higher facial resemblance to them (Bailenson et al., 2008). Weigold et al. (2013) found that facial resemblance affects people's evaluation of others' five major personality factors and intelligence. Facial resemblance also positively affects the perception of trustworthiness and attractiveness (DeBruine, 2002, 2004). While the "reading of face" is supposedly a universal human ability, most prior studies were conducted in Western culture. It is interesting to reconfirm its presence in eastern culture.

Table 1. Summary of the Most Relevant Literature on Facial Resemblance

Reference	Social perceptions	Task context	Moderator	Behavioral intention
Bailenson et al. (2008)	<ul style="list-style-type: none"> <li>• Trait ratings</li> <li>• Affective response</li> <li>• Feeling thermometer</li> </ul>	Political candidate evaluation	Candidate familiarity	Intention to support
DeBruine (2004)	Attractiveness	No task	<ul style="list-style-type: none"> <li>• Same-sex</li> <li>• Other-sex</li> </ul>	—
Krupp et al. (2008)	—	Public good game	—	Public contribution
Weigold et al. (2013)	<ul style="list-style-type: none"> <li>• Extraversion</li> <li>• Emotional stability</li> <li>• Agreeableness</li> <li>• Openness to experience</li> <li>• Conscientiousness</li> <li>• Intelligence</li> </ul>	No task	—	—
DeBruine (2002)	Trustworthiness	Trust game	—	<ul style="list-style-type: none"> <li>• Intention to trust</li> <li>• Intention to betray</li> </ul>
This study	<ul style="list-style-type: none"> <li>• Cognitive trustworthiness</li> <li>• Affective trustworthiness</li> <li>• Attractiveness</li> <li>• Sociability</li> </ul>	Sharing economy	<ul style="list-style-type: none"> <li>• Transaction value</li> <li>• Social value</li> </ul>	Cooperative intention

### Social Perceptions and Cooperative Behavior

Cooperative behaviors are deliberate decisions, because the other party may betray the cooperation and seek self-interest (Fehr & Fischbacher, 2003). Evolutionary psychology suggests that the cognitive processes in the human mind weigh the cost and benefit of a relationship (Cosmides, 1989). To avoid mistakes, people attempt to detect the cooperativeness in others' body language, facial features, facial expressions (Bonnefon et al., 2017), and facial cues (Tognetti et al., 2013).

Prior research has found that social perceptions have a direct influence on cooperative intention (Dijksterhuis & Bargh, 2001). Social perceptions are derived from the appearance, expressions, and gestures of a person (Allison et al., 2000), as well as personal photos (Allison et al., 2000; Sutherland et al., 2013). Individuals make decisions according to their perceptions of others (Hamidi & Moradi, 2017; Rule et al., 2013). In the sharing economy, the trustworthiness, credibility, and sociability of a host enhance the rental decisions of consumers (Zhao et al., 2020; Zloteanu et al., 2018). On the Airbnb platform, the trustworthiness of a host brings not only a higher probability of booking but also a higher rental price (Ert et al., 2016). The physical attractiveness of a salesperson is also associated with a higher purchase intention (DeShields et al., 1996).

### Social Perceptions as Mediators

Based on the literature on facial resemblance and cooperative behavior, this study identifies four social perceptions which mediate the effect of facial resemblance on online cooperative behavior. Two of these perceptions are cognitive and affective trustworthiness. In business contexts, the two dimensions of trust are distinguished by their formation mechanisms (McAllister, 1995; Zhang & Curley, 2018). Perceived cognitive trustworthiness refers to the perceived capabilities and reliability of a potential partner (Johnson & Grayson, 2005) and serves as an indicator of whether this potential

partner can complete a cooperative task and act responsibly. Affective trustworthiness refers to the perceived kindness of a potential partner (Chen et al., 2014; McAllister, 1995) and serves as an indicator of whether the potential partner cares about the user's welfare and emotions. Studies on facial resemblance have investigated the subdimensions of trust, such as kindness and capabilities (DeBruine, 2002), or have considered trust as a unidimensional concept (Ert et al., 2016). The present study differentiates between the two dimensions of trust. The third social perception is attractiveness which refers to the physical beauty of a partner. The perception of attractiveness is a fundamental and intuitive element of the first impression. Prior component analysis has recognized the *youthful attractiveness* dimension as an additional dimension to valence and dominance (Sutherland et al., 2013). The fourth social perception is sociability which refers to the degree to which an individual is willing to interact with others. People are more willing to cooperate with strangers of high sociability (Bucher et al., 2016; Zhang, 2019).

The authors consider the aforementioned four factors for the following reasons. First, these social perceptions have been repeatedly found to be relevant in the context of a cooperative task, especially for online transactions (Aldiri et al., 2008; Brand et al., 2012; Bucher et al., 2016; Zhang, 2019). Second, they encompass and extend the dimensions of social perceptions that have been identified in research on facial resemblance (see Table 1). Third, they encompass the dimensions of the first-impression formation based on human faces, namely trustworthiness, intelligence, and youthful attractiveness (Sutherland et al., 2013). Finally, personality traits such as extraversion, openness to experience, emotional stability, and agreeableness in the five-factor model of personality (Weigold et al., 2013) are implied by sociability, intelligence is implied by cognitive trustworthiness, and conscientiousness is implied by affective trustworthiness. Therefore, the four social perceptions offer good coverage of the dimensions of human personality.

### **The Stimulus–Organism–Response Model and The Kin Selection Theory**

The S–O–R model provides an overarching framework to encompass the relationship between facial resemblance, social perceptions, and cooperative intention. The S–O–R model depicts the whole process from the stimuli to individual behavior (Mehrabian & Russell, 1974). The model posits that a stimulus (S) from the environment can affect an individual's emotional and cognitive states (O) that in turn affect their approach or avoidance responses (R). The S–O–R model is widely adopted in e-commerce research. For instance, the textual and pictorial content of online reviews are also regarded as stimuli to enhance consumers' perception of credibility, helpfulness, and argument quality and lead to positive emotion, empathy, trust, and ultimately intention to visit (Bigne et al., 2020).

The S–O–R model fits the relationship between facial resemblance, social perceptions, and cooperative intention well. A personal photo is a stimulus from the environment. Social perceptions inferred from the photo correspond to the cognitive states. Finally, cooperative intention is a typical approach response. The S–O–R model suggests that social perceptions could mediate the effect of facial resemblance on cooperative intention.

While prior literature and the S–O–R model suggest that people could form social perceptions according to faces, the kin selection theory offers an underlying mechanism to explain why people favor certain individuals. Hamilton proposed the concept of inclusive fitness and the kin selection theory (Hamilton, 1964a, 1964b). In addition to an individual's fitness, inclusive fitness encompasses the fitness of other individuals who share the same genes as this individual. The kin selection theory postulates that nature tends to select genes that maximize inclusive fitness. Accordingly, altruism for relatives exists because it increases collective survival through the perseverance of altruistic genes. Let the genetic relatedness of two individuals be  $r$ , the reproductive benefit of altruism be  $B$ , and the reproductive cost be  $C$ , when  $r \times B > C$ , the altruistic behavior would increase.

Facial resemblance serves as a key indicator of kinship between strangers. An individual first makes a relatedness judgment of a potential partner, and this judgment affects the individual's subsequent social perceptions of the partner (DeBruine, 2002). The facial resemblance serves as a cue

of kinship relatedness; hence, it can enhance social perceptions. Experiments have demonstrated that people's perceptions of children's facial resemblance and their genetic closeness are highly correlated, suggesting that people use facial resemblance as a cue to genetic kinship (Maloney & Dal Martello, 2006). Experiments conducted on adult faces have reproduced the same results (DeBruine et al., 2009).

However, kinship induction based on facial resemblance could have positive or negative implications in human relationships. In a mate-seeking context, the facial resemblance of an opposite-sex partner reduces their perceived attractiveness, possibly due to the avoidance of inbreeding (DeBruine, 2005). However, in other contexts where cooperation is desired, facial resemblance increases individuals' perceptions of the attractiveness of same-sex partners (DeBruine, 2004). It is also possible that people have a negative perception of themselves and project their self-evaluation onto others with a similar look (Kraus & Chen, 2010). However, the percentage of such people is low in the general population as most people strive to maintain positive self-esteem (Baumeister et al., 2005).

In short, the S–O–R model offers a framework to explain the mediation effect of social perception between facial resemblance and cooperative intention, and the kin selection theory posits that (a) genetic relatedness and expected benefit interact to affect altruistic behavior (e.g., cooperative behavior) for inclusive fitness, and (b) facial resemblance is a cue to genetic relatedness. These tenets collectively offer the theoretical underpinning to the formation of social perceptions based on facial resemblance.

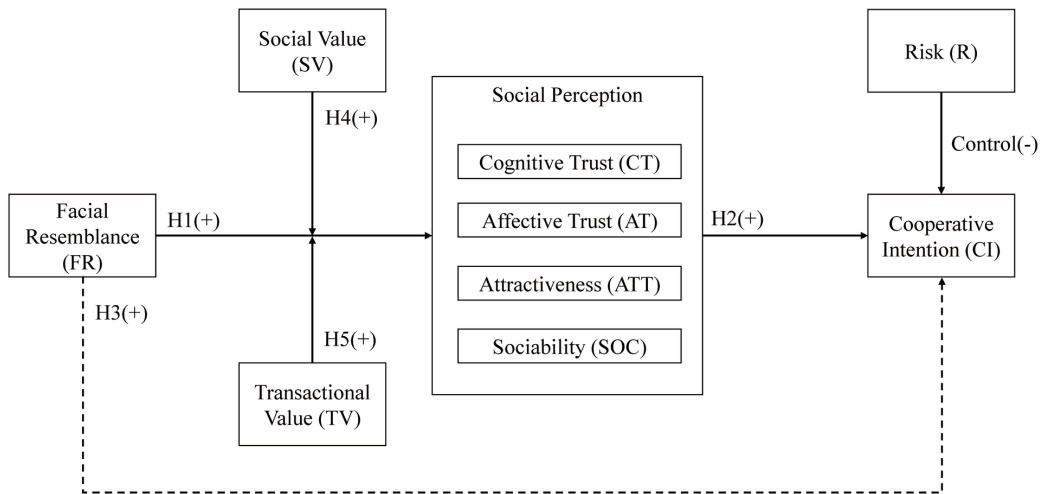
### **Summary of Literature**

The extant literature indicates that facial resemblance affects social perceptions that would affect behavioral intention. The S–O–R model offers a suitable overarching framework, and the kin selection theory explains why facial resemblance could affect social perceptions. However, prior research has not explicitly tested the mediation process by identifying the relevant social perceptions. Neither has prior research focused on the online contexts where most personal photos are displayed. While a few studies (Bailenson et al., 2008; DeBruine, 2004) have explored some potential moderators for facial resemblance, they have not considered contextual task factors. To fill these research gaps, this study proposes a more comprehensive model to study the effect of facial resemblance in the sharing economy.

### **RESEARCH MODEL AND HYPOTHESES**

Figure 1 displays the research model in the context of the sharing economy. According to the S–O–R model and the kin selection theory, the authors postulate that users' cooperative behavior is influenced by the facial resemblance of an online personal photo through the mediation of social perceptions. The authors also postulate that transactional value and social value moderate the formation of social perceptions.

Figure 1. The Research Model



### Direct and Mediated Effects of Facial Resemblance

Facial resemblance affects the perceptions of a partner's traits. According to kin selection theory, people identify kinship according to an individual's face and make corresponding evaluations (Burnstein et al., 1994). Therefore, when people observe a high degree of facial similarity, they subconsciously perceive the partner as more genetically related. The innate need for collective fitness drives them to perceive the partner as more trustworthy (DeBruine, 2002), including both cognitive trustworthiness and affective trustworthiness (McAllister, 1995).

Except for mate-seeking contexts, research based on the kin selection theory also suggests that people regard similar faces as more attractive in prosocial contexts (Bailenson et al., 2008; DeBruine, 2004). A prosocial context is a context that demands one to assist, comfort, or cooperate with others (Sproull, 2011). The context of sharing economy is a prosocial context that calls for cooperation. Bailenson et al. (2008) suggested that in addition to kin selection, similar faces also have a mere exposure effect. That is, a familiar face is considered more attractive because one has been exposed to it before (i.e., one's face as a proxy of the new face).

Finally, because of the perceived kinship, people perceive similar others as being more like-minded and sociable. People infer sociability from personal photos (Oosterhof & Todorov, 2008). A similar face elicits the so-called transference effect, that is, one projects his personality onto the other (Kraus & Chen, 2010). People prefer to interact with similar individuals (Massen & Koski, 2014; McPherson et al., 2001). Therefore, they regard a similar face as more sociable. In summary, the authors propose the following hypothesis:

**H1:** Facial resemblance between a partner and an individual, as perceived by the individual according to a photo of the *partner*, positively affects the perceived (a) cognitive trustworthiness, (b) affective trustworthiness, (c) attractiveness, and (d) sociability of the partner.

Based on the S–O–R model, social perceptions, in turn, affect users' approach or avoidance responses. First, the perception of trustworthiness affects cooperative intention (Rahman et al., 2020). Trust is the cornerstone of business activities (Chau et al., 2007; Mou et al., 2017; Teubner et al., 2017). In the context of the sharing economy, trust has a notable effect on transactions because a partner is often a stranger (Lee & Pee, 2015). Cognitive trustworthiness reduces one's concern

about the partner's ability to complete a task. Affective trustworthiness reduces interpersonal risk and suggests the prosocial behavior of the partner. Therefore, both cognitive trustworthiness and affective trustworthiness enhance cooperative intention.

Second, the assessment of a partner's attractiveness also affects cooperative intention. An attractive person is believed to have more favorable personal traits and be more successful in life (Eagly et al., 1991). In the sharing economy, users are inclined to cooperate with attractive people. When information regarding partners is limited, a user's willingness to pay is higher for a more attractive partner (Brand et al., 2012; Wilson & Eckel, 2006).

Finally, people prefer to interact with highly sociable people. In the sharing economy, partners must exchange information and sometimes negotiate before making a deal. A partner's sociability reduces communication barriers and helps individuals to meet their social needs. When befriending people is one's goal for interaction, the sociability of a partner is an added value to them. Prior studies found that one's selection of partners is affected by the perception of the partners' sociability (Bucher et al., 2016; Zhang, 2019; Zloteanu et al., 2018). Accordingly, the authors propose the following hypothesis:

H2: An individual's perceptions of a partner's (a) cognitive trustworthiness, (b) affective trustworthiness, (c) attractiveness, and (d) sociability positively affect the individual's cooperative intention with the partner.

The S–O–R model suggests that the influence of facial resemblance on cooperative intention is mediated by social perceptions. According to the S–O–R model, facial resemblance serves as a stimulus to the formation of social perceptions, and the cooperative decision is based on the cost and benefit deliberation of social perceptions. Even if one's cooperative intention is altruistic rather than calculative, facial resemblance can still affect cooperative intention through social perceptions by reducing the perceived risk (Bailenson et al., 2008; Krupp et al., 2008). Besides the S–O–R model that suggests a causal chain, the theory of planned behavior has also been applied to describe a causal chain from perceptual beliefs to attitudes and intentions (Bucher et al., 2016; Zhang, 2019). Therefore, the authors propose the following hypothesis:

H3: The effect of facial resemblance on cooperative intention is mediated by perceived (a) cognitive trustworthiness, (b) affective trustworthiness, (c) attractiveness, and (d) sociability.

## Contextual Task Factors

The effect of facial resemblance on social perceptions depends on the task context. Few relevant studies have considered the effect of moderators on facial resemblance. Favorable social perceptions based on facial resemblance occur within the same gender but not across genders (DeBruine, 2004). Without other information, facial resemblance is more likely to affect social perceptions when a voter is unfamiliar with a political candidate (Bailenson et al., 2008). The authors believe that the *same-gender* condition and the *unfamiliar-parties* condition only set a boundary for facial resemblance to affect social perceptions. However, neither of these conditions is an attribute of the cooperative task.

In sharing economy, user values are important factors that influence users' purchase intention, such as economic value, social value, emotional value, and technical value are essential value propositions (Prashar et al., 2019; Zhang et al., 2019). Dann et al. (2020) have found that social and economic values are equally important to purchase intention in sharing economy. Similar to prior studies (Zhang et al., 2019), this study identifies a transactional value and social value as moderators. *Transactional value* and *social value* refer to the significance of economic utility and relational utility, respectively, and are identified as task attributes. For example, in an online second-hand product market, transactional value is typically more prominent than social value; in a meal-sharing context,



social value is more prominent than transactional value; and in a room-sharing context, both factors are likely to be prominent.

Transactional value and social value moderate the relationship between facial resemblance and the expected return. Hamilton's rule states that the expected return is equal to the product of the similarity ( $r$ ) and reproductive benefit ( $B$ ; Hamilton, 1964a, 1964b). Because facial resemblance implies similarity (DeBruine et al., 2009), the two types of user values represent the expected benefit. Therefore, both transactional value and social value moderate the relationship between facial resemblance and expected return.

The two types of user values also sensitize users to facial cues. Users seeking high transactional or social value look for facial cues that could suggest favorable personalities for the desired outcome. Thus, a photo with similar facial features is more likely to induce favorable social perceptions. Conversely, users seeking little transactional or social value do not bother to scrutinize a partner's face. Therefore, the authors propose the following hypotheses:

- H4: Social value positively moderates the effect of facial resemblance on individuals' perceptions of a partner's (a) cognitive trustworthiness, (b) affective trustworthiness, (c) attractiveness, and (d) sociability.
- H5: Transactional value positively moderates the effect of facial resemblance on individuals' perceptions of a partner's (a) cognitive trustworthiness, (b) affective trustworthiness, (c) attractiveness, and (d) sociability.

In the context of sharing economy, the risk of a cooperative task is often a major factor influencing behavioral intention (Chang & Wang, 2018; Dai et al., 2018; Kim et al., 2008). The authors define risk as the amount of loss that users may incur during a task and regard it as a control variable for cooperative intention (Mou et al., 2020; Rouibah et al., 2022).

## RESEARCH METHODOLOGY

For data collection, the authors used a vignette-based survey (Alexander & Becker, 1978) that involved presenting participants with a manipulated experimental scenario. This experiment-like design was used to control extraneous variables and to better establish the causality of the model. The ethics committee of the author's affiliation granted ethical approval for this study. All participants provided informed consent for experimentation. The privacy rights of participants were protected.

Following the literature, the authors controlled gender in the experiment (DeBruine, 2004). Participants were shown photos of people of their gender. The data sets for men and women were analyzed separately. The authors designed four task scenarios to cover different combinations of high and low transactional value and social value. Because the authors do not hypothesize the interaction effects between transactional and social values, the purpose of the four scenarios was to only cover possible combinations of task contexts for generalizability. The participants, who were college students, were asked to use a hypothetical app to exchange idle books. The authors chose idle book exchange as the experimental task to avoid subjects' pre-set value perceptions of typical sharing economy services such as room-sharing. To manipulate the transactional value, the participants were asked to exchange idle books for more valuable books or to get rid of them. To manipulate the social value, they were asked to exchange books to befriend people with similar reading interests or to exchange books without such an intention (see Table 2).

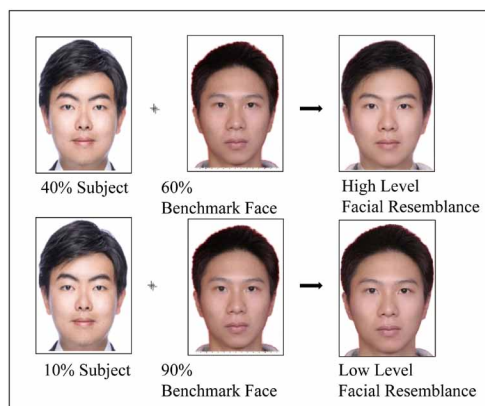
Table 2. Manipulations of Transactional Value and Social Value in Task Scenarios

	Transactional value	
	High	Low
High social value	I intend to find people with the same reading interest and make some friends so that I feel happier and less lonely. I also intend to acquire items that are valuable to me.	I intend to find people with the same reading interests and make friends so that I feel happier and less lonely. I also want to declutter and discard items that I do not need. I do not care about what I obtain. I can give away what I acquire as a gift.
Low social value	I have no intention to build a relationship with the people I make exchanges with. However, I intend to obtain items that are valuable to me.	I have no intention to form a relationship with the people I make exchanges with. I also want to declutter and discard items that I do not need. I do not care about what I obtain. I can give away what I acquire as a gift.

The participants were randomly assigned to one scenario. Each participant was shown five photos representing five potential bartering partners. Adopting the common practice in the literature, the authors used the self-morphing technique to digitally manipulate the facial resemblance of the five partners' photos, so that they had various degrees of resemblance to the subject's face (DeBruine, 2002). The personal photos of the participants were collected. Each participant evaluated four photos of low facial resemblance and one photo of high facial resemblance because the probability of encountering a stranger with a similar face is generally lower. Following previous studies (Bailenson et al., 2008), the weight of a participant's photo was set to 40% in blending to achieve a high level of facial resemblance and 10% for a low level of facial resemblance. The low-resemblance blending controlled the effects of the morphing technology on the image, such as the smoothing effect.

The authors conducted a pilot experiment to test the instrument and to select an appropriate photo as a benchmark photo to produce high-resemblance blending. The authors randomly selected five male photos and five female photos from a photo bank as partner photos. The authors recruited 142 female and 47 male college students for the pilot experiment. They reported their social perceptions of five photos of people of the same gender. According to the perception scores, the authors selected a photo with a medium level of social perceptions as the benchmark photo. The other four photos were used to create low-resemblance faces. Figure 2 illustrates the effect of morphing a participant's photo. The use of the same partner photos for all the participants was to prevent the bias introduced by the particular social cues of the partner's photo.

Figure 2. Effect of Morphing a Participant's Photo



In the main experiment, the authors recruited another 102 female and 96 male college students. These students were randomly assigned to four task scenarios. The participants were first asked to read a bartering scenario (see Table 2) and then evaluate the transactional value, social value, and risk of the task. They were then shown five morphed photos in random order and were asked to evaluate their cooperative intention and their social perceptions of the partner. Finally, the five morphed photos were displayed again together, and the participants were asked to select the photo that they perceived as most similar to themselves. This step was to verify the facial resemblance manipulation.

The items of the constructs were based on validated measurements, except for the three new items for sociability (refer to the Appendix). All measurements used a seven-point Likert scale or semantic differential scale. The items for social value measured the importance of a partner being easy to get along with, having a good relationship with the partner, and developing a friendship with the partner (Kim et al., 2015). The items for transactional value measured the importance of high returns, cost-saving, and economic value (Tussyadiah, 2016). The items for cooperative intention measured the willingness to cooperate with a person and to select the person for the task and the perception of the person as a suitable partner (Ert et al., 2016). The items for cognitive worthiness measured the ability and intelligence of the person in the photo (Johnson & Grayson, 2005). The items for affective trustworthiness measured the honesty, creditworthiness, carefulness, and kindness of the partner (Chen et al., 2014). The items for attractiveness measured the beauty of the partner (Wilson & Eckel, 2006). The authors self-developed the items for sociability, which measured the temperament of the partner, ease of communicating with the partner, and ease of getting along with the partner.

## DATA ANALYSIS AND RESULTS

Because each participant evaluated five morphed photos, the data had a within-subject structure. The authors conducted a multilevel confirmatory factor analysis (MCFA) on the data from the pilot experiments to test the measurement model. Moreover, the authors performed multilevel structural equation modeling (MSEM; Geldhof et al., 2014) on the data from the main experiment to test the proposed hypotheses. A total of 900 [ $5 \times (135 + 45)$ ] observations from 135 female and 45 male participants were obtained in the pilot experiment. MCFA indicated that the fitness of the measurement model was satisfactory (normalized chi-squared  $< 3$ , RMESA = 0.086, CFI = 0.923, and TLI = 0.894; Hu & Bentler, 1999). The model also exhibited satisfactory convergent and discriminant validity. The square root of all the average variances extracted (AVEs) was greater than 0.5. The factor loadings of all items were greater than 0.70. The composite factor reliability (CFR) of all factors was greater than 0.7. The correlations among the factors were also lower than the square root of the AVE. Separate tests of the measurement model by subject gender indicated satisfactory convergent and discriminant validity as well.

A total of 885 [ $5 \times (89 + 88)$ ] observations from 89 female and 88 male participants were obtained in the main experiment. The authors retested the measurement model with the data. The MCFA results indicated that the measurement model fit well (normalized chi-squared  $< 3$ , RMESA = 0.045, CFI = 0.963, and TLI = 0.953). Moreover, the convergent validity and the discriminant validity of the measurement model were satisfactory based on the aforementioned criteria (refer to Table 3 for correlations). A *t*-test indicated that social value ( $t_{(89)} = 30.350, p < 0.001$ ) and transactional value ( $t_{(89)} = 8.502, p < 0.001$ ) were successfully manipulated. Of the 89 female participants, 58 selected the photo with 40% morphing as the most similar to themselves. A chi-squared test indicated significance ( $\chi^2_{(4)} = 221.212, p = 0.000$ ). Of the 88 male participants, 67 selected the photo with 40% morphing ( $\chi^2_{(4)} = 282.437, p = 0.000$ ).

Table 3. Factor Correlation and the Square Root of the AVE in the Main Study

	Mean	SD	SV	TV	R	CI	CT	AT	ATT	SOC
SV	3.857	2.351	<b>0.978</b>							
TV	3.663	2.267	-0.199	<b>0.971</b>						
R	3.569	1.582	0.342	0.303	<b>0.876</b>					
CI	4.606	1.364	-0.060	-0.085	-0.157	<b>0.923</b>				
CT	4.553	1.188	0.096	-0.044	-0.102	0.493	<b>0.842</b>			
AT	4.682	1.178	0.052	-0.107	-0.114	0.770	0.443	<b>0.862</b>		
ATT	3.722	1.284	0.091	-0.064	0.008	0.624	0.676	0.562	<b>0.896</b>	
SOC	4.478	1.289	-0.006	-0.097	-0.068	0.726	0.327	0.758	0.555	<b>0.902</b>

Note. SV = social value, TV = transactional value, R = risk, CI = cooperative intention, CT = cognitive trustworthiness, AT = affective trustworthiness, ATT = attractiveness, and SOC = sociability. Square roots of the AVEs appear in bold in diagonal cells.

With a satisfactory measurement model, the authors performed MSEM by using the structural equation modeling package Mplus to test hypotheses for the female and male samples. For the female participants, facial resemblance had a significant positive effect on cognitive trustworthiness ( $b = 0.225, p = 0.004$ ), affective trustworthiness ( $b = 0.205, p = 0.020$ ), attractiveness ( $b = 0.379, p = 0.000$ ), and sociability ( $b = 0.218, p = 0.042$ ). Moreover, cognitive trustworthiness ( $b = 0.103, p = 0.035$ ), affective trustworthiness ( $b = 0.420, p < 0.001$ ), attractiveness ( $b = 0.174, p = 0.001$ ), and sociability ( $b = 0.249, p = 0.000$ ) had significant positive effects on cooperative intention. Thus, H1a, H1b, H1c, H1d, H2a, H2b, H2c, and H2d were supported. Risk had an insignificant effect on cooperative intention, possibly because there was no obvious risk in the experimental scenarios.

The authors examined the mediating effects of social perceptions on the relationship between facial resemblance and cooperative intention. For the female participants, the authors tested the overall mediation effect of social perceptions with a Wald test. The results indicated that the overall mediation effect was significant ( $z_{(\alpha=0.05)} = 9.49, \chi^2_{(4)} = 16.827, p = 0.002$ ). Individual tests indicated that the mediation effects of cognitive trustworthiness ( $b = 0.023, p = 0.069$ ), affective trustworthiness ( $b = 0.086, p = 0.027$ ), attractiveness ( $b = 0.066, p = 0.011$ ), and sociability ( $b = 0.054, p = 0.039$ ) were significant. Therefore, hypotheses H3a, H3b, H3c, and H3d were supported. After social perceptions were controlled for, the direct effect of facial resemblance on cooperative intention ( $b = 0.096, p = 0.136$ ) was insignificant. Therefore, for the female participants, the effect of facial resemblance on cooperative intention was fully mediated by social perceptions.

After averaging the factor scores of the items, the authors examined the moderating effect of contextual factors (see Table 4). The effect of facial resemblance on cognitive trustworthiness was significantly moderated by transactional value ( $b = 0.184, p = 0.016$ ) and weakly moderated by social value ( $b = 0.118, p = 0.097$ ). Moreover, the effect of facial resemblance on attractiveness was significantly moderated by transactional value ( $b = 0.184, p = 0.016$ ). Thus, hypotheses H4a, H5a, and H5c were supported by the collected data. However, hypotheses H4b, H4c, H4d, H5b, and H5d were not supported. Therefore, user values affected some but not all social perceptions.

Table 4. Coefficients of the Moderation Effects for the Female and Male Participants

	Female sample		Male sample	
	Social value	Transactional value	Social value	Transactional value
Cognitive trustworthiness	0.118*	0.184**	-0.047	-0.002
Affective trustworthiness	-0.077	0.046	-0.021	0.056
Attractiveness	-0.077	0.156*	0.004	0.105
Sociability	-0.071	0.005	0.039	0.119

Note. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

For the male participants, facial resemblance had a significant positive effect on cognitive trustworthiness ( $b = 0.330, p < 0.001$ ), affective trustworthiness ( $b = 0.459, p < 0.001$ ), attractiveness ( $b = 0.473, p < 0.001$ ), and sociability ( $b = 0.478, p < 0.001$ ). Cognitive trustworthiness ( $b = 0.094, p = 0.008$ ), affective trustworthiness ( $b = 0.409, p < 0.001$ ), attractiveness ( $b = 0.195, p < 0.001$ ), and sociability ( $b = 0.204, p = 0.001$ ) had significant positive effects on cooperative intention. Thus, hypotheses H1a, H1b, H1c, H1d, H2a, H2b, H2c, and H2d were supported. Risk had an insignificant effect on cooperative intention.

The results of the Wald test indicated that the overall mediation effect of the four social perceptions was significant ( $z_{(\alpha=0.05)} = 9.49, \chi^2_{(4)} = 29.702, p = 0.000$ ). Moreover, the individual mediating effects of cognitive trustworthiness ( $b = 0.031, p = 0.027$ ), affective trustworthiness ( $b = 0.188, p = 0.000$ ), attractiveness ( $b = 0.092, p = 0.006$ ), and sociability ( $b = 0.097, p = 0.005$ ) were significant. Thus, hypotheses H3a, H3b, H3c, and H3d were supported by data. In contrast to the result of the female participants, after social perceptions were controlled for, the direct effect of facial resemblance on cooperative intention remained significant ( $b = 0.149, p = 0.009$ ) for the male participants. Therefore, social perceptions only partially mediated the effect of facial resemblance on the cooperative intention of the male participants. However, the moderating effects of user values on social perceptions were insignificant for the male participants (see Table 4). Hypotheses H4a, H4b, H4c, H4d, H5a, H5b, H5c, and H5d were not supported.

## CONCLUSION

### Discussion

In the sharing economy, can platforms match users by their personal photos to facilitate cooperation? According to the S–O–R model and the kin selection theory, the theoretical model of this study postulates the effect of online facial resemblance on four social perceptions and ultimately on cooperative intention. Social value and transactional value are postulated to moderate the effect of facial resemblance on social perceptions.

In accordance with the literature that has suggested the gender difference in the formation of social perceptions based on personal photos (Rehman & Herlitz, 2006), this study treats male participants and female participants as independent samples. The empirical results indicate that facial resemblance had a strong effect on the social perceptions of the male and female participants, which is consistent with previous studies (Bailenson et al., 2008; Möhlmann, 2015). Moreover, social perceptions mediated the effect of facial resemblance on cooperative intention. For the female participants, social perceptions fully mediated the relationship between facial resemblance and cooperative intention. By contrast, for the male participants, the mediation effect was partial.

While the objective of this study is to explore how facial resemblance affects cooperative intention through social perceptions in a task context, the different mediation effects found between male and female samples call for theoretical exploration in future research. There are two plausible

explanations. First, male and female photos differ in the conveyance of personal traits. Prior study has found that both males and females can identify which individual is more altruistic from two male photos; however, neither male nor female can detect the more altruistic one from two female photos (Tognetti et al., 2013). Second, subjects may induce some social perceptions from male partners but not from female partners. For example, a prior study has found that the width of a male face may indicate aggression (Carré et al., 2009; Efferson & Vogt, 2013). Therefore, the male subjects may have an additional route of the causal chain from facial resemblance to cooperative intention.

The authors also found the moderation effects of contextual factors were only partially and marginally supported. Transactional value and social value had partial moderation effects on cognitive trustworthiness and attractiveness for the female participants. However, no moderation effect was found for male participants. A possible explanation is that although the transactional and social values passed the manipulation check at the perception level, they were practically insufficient to produce a psychological impact on male subjects. Nevertheless, the partial support from female participants suggests that the moderation effects of user values shall not be dismissed and is worthy of future investigation.

## **Implications**

This research makes the following theoretical contributions. First, this study introduces the kin selection theory and integrates it with the S–O–R model to explain why facial resemblance would affect cooperative intention in the context of sharing economy. This study recognizes the importance of personal photos as an information source in the formation of social perceptions (Maloney & Dal Martello, 2006). The authors develop a mediation model to reveal the indirect effect of facial resemblance on cooperative intention through social perceptions. Second, this study enriches the literature on facial resemblance in social psychology by examining a more comprehensive set of social perceptions. The results of this study suggest that people's interpretation of facial resemblance is not limited to trustworthiness and attractiveness, the two most studied dimensions. Third, although it is only weakly supported, this study proposes task factors, i.e., social value and transactional value, as moderators in the formation of social perceptions based on facial resemblance. This contingent view of facial resemblance has not been considered. Although the data only partially support their moderation effects, they suggest a new research direction. Finally, this study tests the effects of facial resemblance in eastern culture and reconfirms their generalizability in various cultures.

This research also guides practitioners in the sharing economy. For platforms, since users frequently encounter and evaluate new partners, the results of this study suggest that a matching system may consider the match of personalities and that facial resemblance serves as means to approximate personality matching. A recommendation system can be enhanced by considering facial resemblance along with other criteria, provided that the personal photos of both parties are available (Tchunte, 2022). This research also suggests that the moderation effect of the transactional and social value of a transaction is greater for female users. Therefore, for female users, a recommendation based on facial resemblance is more helpful in such transactions. However, the contribution of facial resemblance relative to other criteria (e.g., user ratings) is yet to be empirically explored. For online sellers (e.g., hosts on Airbnb), the disclosure of personal photos can at least attract people with a similar look. This is particularly helpful if the seller is new on the platform and has no other credentials. The findings of this study may also apply to other Internet-based services involving personal photos. For example, blog platforms may recommend fans according to facial resemblance to increase the possibility of establishing new links.

## **Limitations and Future Research**

The findings of this study shall be interpreted with their limitations. First, this study treated male and female subjects as two independent samples in data analysis because previous studies have suggested that men and women have different abilities in perceiving faces (Lewin & Herlitz, 2002). Since the

gender difference in the formation of social perceptions based on facial resemblance is subtle and unclear, the authors did not propose separate theoretical models for men and women to explore the nuisance. Once the formation mechanisms are better understood, future research may propose separate models for men and women.

Second, in this experiment, the participants were exposed to photos of the same sex, while in an actual online environment, they might be exposed to both genders. The current design was to control the influence of courtship motives (DeBruine, 2004). Future research can factor in the courtship motive and extend this experimental design to cover the cross-gender scenario.

Third, an experimental environment was used to collect the data for this study, which might limit the generalizability of the findings. For example, the perceived user values might be less substantial than those in an actual scenario. Meanwhile, the perceived risk might also be less substantial. The artificial setting might have weakened the effect of these variables. Furthermore, an actual task context in the sharing economy may involve other factors, such as price and product quality, to affect cooperative intention. Future research could measure the relative importance of facial resemblance to other evaluation criteria.

Fourth, the participants of this study were recruited from the university and did not represent the full spectrum of users of sharing economy. Future research may extend the findings of this study to cover other age groups. Also, the subjects of this study were all Chinese subjects, which might limit the generalizability of the findings to other countries. Future research may verify the findings of this study in other countries.

Finally, this study considered only one context (i.e., second-hand book exchange) and two task factors (i.e., social value and transactional value). Cooperative tasks in sharing economy vary in other attributes as well, such as non-profit or for-profit. Besides social and transactional values, people may also seek pleasure in a task. Future research may explore other task contexts and various task attributes.

### **Competing Interests**

The authors of this publication declare there are no competing interests.

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## APPENDIX

Social value (SV; 1 = *very insignificant*; 7 = *very significant*; adapted from D. J. Kim et al., 2008)

- In this scenario, it is \_\_\_\_\_ to me whether the partner is an easy-going person.
- In this scenario, having a good relationship with the partner is a \_\_\_\_\_ consideration.
- In this scenario, making friends and developing a friendship with a partner is \_\_\_\_\_ to me.

Transactional value (TV; 1 = *very insignificant*; 7 = *very significant*; adapted from Tussyadiah, 2016)

- In this scenario, increasing revenue and saving expenses are \_\_\_\_\_ for me.
- In this scenario, the economic value of the deal is a \_\_\_\_\_ consideration for me.
- In this scenario, economic considerations (such as getting wanted items) are my \_\_\_\_\_ motivation for participation.

Perceived risk (R; 1 = *very small*; 7 = *very large*; adapted from D. J. Kim et al., 2008)

- When online bartering has a negative outcome, the potential loss is \_\_\_\_\_ to me.
- If I end up with an unsatisfactory trading partner, the negative effect on me is expected to be \_\_\_\_\_.
- The negative consequences of ending up with the wrong partner are \_\_\_\_\_ to me.

Cooperative intention (CI; 1 = *strongly disagree*; 7 = *strongly agree*; adapted from Ert et al., 2016)

- I am willing to cooperate with this person.
- I am willing to choose this person in the scenario.
- I believe this person is the right partner.

Cognitive trustworthiness (CT; 1 = *not at all*; 7 = *very*; adapted from Johnson & Grayson, 2005)

- She/he looks \_\_\_\_\_ capable.
- She/he looks \_\_\_\_\_ wise.

Affective trustworthiness (AT; 1 = *not at all*; 7 = *very*; adapted from Chen et al., 2014)

- She/he looks \_\_\_\_\_ honest.
- She/he looks \_\_\_\_\_ creditworthy.
- She/he looks \_\_\_\_\_ kind.
- She/he looks \_\_\_\_\_ caring.

Attractiveness (ATT; 1 = *not at all*; 7 = *very*; adapted from Wilson & Eckel, 2006)

- She/he looks \_\_\_\_\_ pretty / handsome.
- She/he looks \_\_\_\_\_ charming.
- She/he looks \_\_\_\_\_ attractive.

Sociability (SOC; 1 = *not at all*; 7 = *very*; self-developed)

- She/he looks like \_\_\_\_\_ a good-tempered person.

- She/he looks \_\_\_\_ easy to communicate.
- She/he looks \_\_\_\_ easy to get along with.