HOW DO I KNOW YOU? PERSON PERCEPTION FROM PHOTOGRAPHS TO LIVE INTERACTIONS

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Mental representations of unknown others play a central role in person perception. These representations, informed by our memories as well as the affective associations we acquire though our past experiences, heavily influence how we perceive, evaluate, and react to new people we encounter in our day-to-day lives. Three papers aim to understand the antecedents and consequences of these representations at different stages of relationship formation and functioning—from evaluating unknown others to getting acquainted with these individuals. The first paper focused on idiosyncratic cues pertaining to representations of significant others and showed that women evaluated unknown men who resembled their partner (vs. those who did not) more favorably, even when they were not consciously aware of the idiosyncratic cue. In everyday person perception, such idiosyncratic cues are encountered simultaneously with cues shared across perceivers. The second paper provided the first systematic examination of how resemblance to known others (an idiosyncratic cue) and facial width-to-height ratio (a shared cue) simultaneously influence person perception. Shared and idiosyncratic cues had additive effects when participants made evaluative judgments (i.e., snap judgments of liking). Across three studies, facial width-to-height ratio was negatively related to liking. However, this association was significantly attenuated for women with a wide-faced romantic partner. The idiosyncratic cue predicted liking only when novel faces resembled newly encountered people who engaged in blameworthy behaviors or when they resembled significant others. Shared and idiosyncratic cues interacted to influence processing efficiency when participants made

categorical judgments (i.e., indicated whether unknown faces resembled someone they knew). Participants made slower and less accurate responses to wider faces resembling a liked known other (vs. not). By focusing on static photographs of faces, these studies showed that shared and idiosyncratic cues profoundly influence person perception. The third paper complements this research by showing that likeability judgments from photographs predicted likeability judgments following live interactions, even when judgments were separated by two weeks and when interactions provided more opportunities to learn about the person. Drawing from theorizing on mental representations, the present research sheds light on the multitude of factors that influence everyday person perception from photographs to live interactions.

BIOGRAPHICAL SKETCH

Gul Gunaydin received her B.S. in business from Middle East Technical University, Turkey. Before starting her graduate training at Cornell University, she spent a year at the University of California, Berkeley as a Fulbright Fellow conducting research on interpersonal relationships. She completed her Ph. D. in Social and Personality Psychology at Cornell, with a minor in Cognitive Science. Gul will join the faculty of Bilkent University, Turkey as an Assistant Professor of Psychology. In her program of research, she studies interpersonal relationships from an interdisciplinary approach that draws on research and theory from social and cognitive psychology. Her current work focuses on how others from unknown individuals to romantic partners are mentally represented and the consequences of these representations for impression formation, interpersonal behavior, and emotion regulation. Outside of research, Gul remains a lifelong aficionado of good food, fashion, and travelling in search of both.

Canım aşkım, can arkadaşım, bir tanecik sevgilim Emre’ye.

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CHAPTER 1

INTRODUCTION: REPRESENTATIONS OF UNKNOWN OTHERS

Upon meeting an unknown other, we seldom take in the information about this person in an unbiased manner but use our existing knowledge about the world and people in general to make sense of him or her. This knowledge is based on *mental representations of unknown others*—our mental image of how a trustworthy, dominant, intelligent, etc. person looks like and acts. These mental representations, informed by our memories as well as the affective associations we acquire though our past experiences, heavily influence how we perceive, evaluate, and react to new people we encounter in our day-to-day lives.

How can we have representations of "unknown others"—people we never met? Our existing representations of known others, members of social groups, and various physical cues are what inform representations of unknown others. Through our past experiences with people that we know (e.g., parents, family members, peers, partners), we learn that certain physical features and behaviors are indicative of certain traits (e.g., Stirrat & Perrett, 2010; Verosky & Todorov, 2010; Todorov & Uleman, 2002). These *idiosyncratic* representations are complemented by representations *shared* by some or many members of our social group. For instance, information learned through media and cultural teachings (e.g., Weisbuch & Pauker, 2011) contribute to how we mentally represent people from certain social categories (e.g., Whites, Blacks, Asians). Moreover, facial features that resemble stimuli that have adaptive significance—such as happy expressions and babies—are represented more favorably in our minds (e.g., Zebrowitz & Montepare, 2008). Altogether, these idiosyncratic and shared representations define how we mentally represent unknown others and guide our first impressions upon meeting a new person. The relative importance of each representation in impression formation depends on the characteristics of the person, the context he or she is encountered, and how accessible each representation is.

What is the evidence that we have representations of unknown others?

The past decade has witnessed an increase in cross-disciplinary work spanning from cognitive and social psychology to psychophysics using tools such as reaction times measures, reverse correlation techniques, and computer models to understand how we mentally represent unknown others. Extant evidence on first impressions strongly suggests that individuals already have preconceptions about physical characteristics and behaviors that signal particular traits in an unknown other. For example, upon learning about a person's behavior, perceivers tend to spontaneously infer traits (e.g., Todorov & Uleman, 2002; 2003; 2004), suggesting that individuals already have extensive knowledge about behaviors signaling certain traits. Importantly, learning about an unknown other's behaviors leads to neural activation in areas implicated in person perception (i.e., amygdala and posterior cingulate cortex) *only when* these behaviors are consistent (vs. inconsistent) with subsequent impressions of this person (Schiller, Freeman, Mitchell, Uleman, & Phelps, 2009). This provides evidence that perceivers are not taking into account all incoming social information while forming impressions but rather weighting pieces of information according to existing representations of unknown others.

In addition to representing behaviors signaling certain traits, perceivers also have visual representations of how, for example, a trustworthy or a dominant person looks like. Todorov and colleagues used perceivers' ratings of randomly generated faces to construct computer models revealing how a trustworthy or a dominant face is represented by most perceivers (Oosterhof & Todorov, 2008). In other work utilizing reverse correlation techniques, they superimposed different patterns of random noise on an average face and asked participants in a forced choice task which of the two faces has a certain trait—such as trustworthiness or dominance (Dotsch & Todorov, 2011). By averaging across the patterns of noise belonging to those faces selected by participants as more trustworthy or dominant, they revealed how perceivers represent a trustworthy or a dominant face, respectively. Moreover, Willis and Todorov (2006) showed considerable agreement among perceivers about judgments of faces on traits such as trustworthiness and aggressiveness (Cronbach alphas ranging between .85 and .97). These

judgments, made under no time constraints, were significantly associated with snap judgments made in less than a fraction of a second, suggesting that representations of unknown others can be activated and applied to a new person automatically.

Although this work seems to suggest that representations of unknown others are largely shared across perceivers, other work (e.g., Hönekopp, 2006) revealed that methods such as Cronbach's alpha overestimate how much perceivers agree on their judgments. Specifically, when the number of perceivers is large—as in a typical psychology study—agreement across perceivers may seem very high even when the intercorrelations between perceivers' judgments are small. To be able to estimate the role of idiosyncratic and shared influences on judgments, Hönekopp (2006) asked participants to repeatedly rate the same set of faces on attractiveness. Results showed that idiosyncratic taste and shared taste accounted for roughly equal variance in judgments of attractiveness. Although whether the same holds for other judgments—such as trustworthiness and dominance—remains to be tested, this work suggests that idiosyncratic aspects of mental representations of unknown others are as prominent as their shared aspects.

Shared and idiosyncratic representations inform how we represent unknown others

Mental representations that contribute to how we represent unknown others lie on a continuum in the degree to which they are idiosyncratic (i.e., in the eye of the beholder) or shared across perceivers. The more a mental representation is shaped by unique past experiences, the closer it is to the idiosyncratic end of the continuum. For instance, experiences one has with a romantic partner are often unique so representations of romantic partners will likely vary from perceiver to perceiver. Although there are shared aspects of partner representations—for example, individuals in a satisfied relationship tend to idealize their partner (e.g., Gagne & Lydon, 2004)—past work by Andersen and colleagues reveals that idiosyncrasies of these representations often outweigh their shared aspects. This work revealed that mental representations of significant others can be activated by cues pertaining to one's own but not someone else's significant other (e.g., Andersen & Baum, 1994; Kraus & Chen, 2010),

suggesting that the representation of a specific significant other—such as one's romantic partner—are largely idiosyncratic.

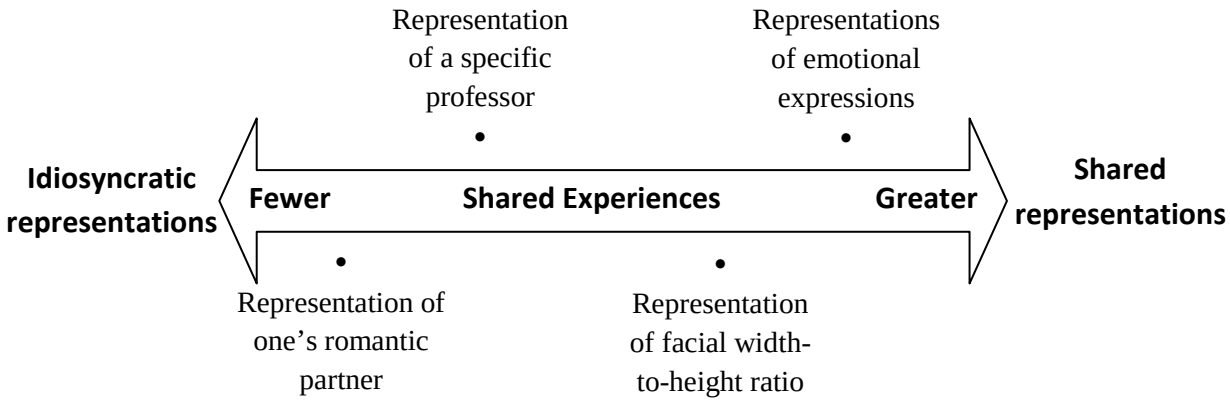

Figure 1.1. Examples of idiosyncratic and shared representations that inform representations of unknown others. The examples lie on a continuum based on the degree to which they are idiosyncratic vs. shared across perceivers. An important factor determining the relative idiosyncrasy of a representation is the extent to which perceivers are exposed to similar experiences during the formation of the representation.

To the extent that perceivers go through similar experiences while forming mental representations, these representations move away from the idiosyncratic end of the continuum and closer to the shared end. For instance, compared with the representation of one's romantic partner, one's introduction to psychology professor is likely to be represented similarly across a greater number of perceivers—those students who take the professor's class will form relatively more similar—albeit not identical—representations of the professor assuming that they are sufficiently motivated to attend to psychological and physical characteristics of the professor during the lectures (e.g., Fiske & Neuberg, 1990; Fiske, Neuberg, Beattie, & Milberg, 1987). As the number of perceivers exposed to common knowledge about a given individual—such as a celebrity (e.g., Tanner & Maeng, 2012)—or groups of individuals—such as members of stereotyped groups (e.g., Weisbuch, Pauker, & Ambady, 2009)—increases, the representations

are likely to be less idiosyncratic and more shared. One source of shared knowledge is information transmitted through the media. A rather dramatic demonstration of how media disseminates information about and thus shapes representations of stereotyped groups is provided by Weisbuch and colleagues (2009), who demonstrated that nonverbal behaviors toward African-Americans (vs. Whites) were more negative in popular TV shows. Importantly, exposing participants to TV shows featuring such nonverbal bias (vs. not) led to less favorable implicit evaluations of African-Americans. This reveals that the extent to which perceivers are exposed to similar experiences about a social category is a key factor determining how similar the representation of that social category is across perceivers.

Another example of the ways by which perceivers may go through similar experiences while constructing a mental representation is if they repeatedly observe different individuals with a particular facial feature engage in similar behaviors. Research showed that men with wider (vs. narrower) faces are more likely to engage in untrustworthy behaviors—such as cheating and deception (Haselhuhn & Wong, 2012)—and to display aggressive behaviors—such as shoving an opponent during a sports game (Carre & McCormick, 2008). With exposure to men with wider faces exhibiting aggressive and untrustworthy behaviors, individuals might be learning that facial width-to-height ratio (WHR) is a reliable signal of male trustworthiness and aggression (Stirrat & Perrett, 2010). Indeed, both Chinese and Caucasian perceivers judge men with wider (vs. narrower) faces as more aggressive (Carre, McCormick, & Mondloch, 2009; Short, Mondloch, McCormick, Carre, Ma, Fu, & Lee, 2011), revealing that facial WHR might be one of the cues underlying the agreement on who is aggressive. Moreover, research by Stirrat and Perrett (2010) provided evidence that this cue is linked to judgments of trustworthiness. Specifically, participants were presented with a wider and a narrower version of the same male face and were asked to select the face that looked more trustworthy. Results revealed that 58% of the participants more often selected the narrower faces as more trustworthy, suggesting that perceivers display some agreement in how they represent facial WHR.

Representations that are assumed to be shared across the greatest number of different individuals pertain to cues with adaptive significance—such as basic emotions and babies—given these cues elicit similar responses from perceivers across the globe (e.g., Zebrowitz & Montepare, 2008), some cross-cultural differences notwithstanding (e.g., Mesquita & Frijda, 1992). For example, facial features resembling a happy expression are evaluated more favorably than features resembling a fearful or disgusted expression (e.g., Said, Sebe, & Todorov, 2009). Similarly, facial features resembling babies (vs. not) lead to more favorable evaluations (e.g., Zebrowitz, Fellous, Mignault, & Andreoletti, 2003). Moreover, research by Zebrowitz, Montepare, and Lee (1993) provided evidence that there is agreement across cultural groups in judgments of faces on babyfacedness and on traits related to babyfacedness—such as warmth, naiveté, honesty, submissiveness. Specifically, White, Black, and Korean participants' mean trait judgments for each face were highly correlated (correlations ranging between .61 and .87). Importantly, the size of these correlations were significantly diminished controlling for perceived babyfacedness of faces, supporting the idea that agreement across cultural groups in trait judgments can be partially accounted by representations of babyish features. Face-space models that reveal shared characteristics of prototypical trustworthy or dominant faces provide converging evidence that representations of emotional expressions and babies contribute to how we mentally represent unknown others (Oosterhof & Todorov, 2008). Specifically, exaggerating facial features of the prototypical trustworthy face results in a happy (vs. angry) expression whereas doing the same for the prototypical dominant face results in mature (vs. babyish) features. Overall, this work suggests that representations pertaining to babyish features and emotional expressions can account for some of the shared aspects of mental representations of unknown others.

Idiosyncratic influences on shared representations

Conceptualizing mental representations as a function of the similarity of perceivers' experiences reveals that even representations that are thought to be shared across different perceivers are susceptible to change through idiosyncratic experiences. These might be

idiosyncratic personal or cultural experiences (e.g., Medin, Bennis, & Chandler, 2010; Weisbuch & Pauker, 2011) as well as differential exposure to information conveyed through the media (e.g., Weisbuch et al., 2009). Indeed, research shows that repeatedly having favorable experiences with members of stereotyped groups (e.g., Page-Gould, Mendoza-Denton, & Tropp, 2008) or pairing them with positive concepts (e.g., Phills, Kawakami, Tabi, Nadolny, & Inzlicht, 2011) leads to more favorable evaluations of these groups. This research suggests that even representations which are thought to be shared are amenable to change with repeated exposure to contradicting information. However, no studies so far have looked at whether representations of facial cues shared across perceivers—such as facial WHR, babyish features, or resemblance to emotional expressions—can be altered by idiosyncratic experiences.

What determines which representations get activated at any given moment?

An important factor contributing to which mental representations get activated and applied to a new person is characteristics of this person. If the person has facial or psychological features resembling a known other or members of a particular social category, the representation of the specific known other or the social category will be activated and used to make sense of the person. Alternatively, perceiving a cue associated with a certain trait (e.g., a greater WHR, resemblance to a happy expression, babyish features) can activate the representation of that cue and the category of people who possess that cue. Another factor contributing to which mental representations get activated is the context in which the person is encountered. For example, representation of the social category black is more likely to be activated when a black person is encountered in an all-white group than in a mixed group (e.g., Taylor, Fiske, Etcoff, & Ruderman, 1978). Of course, some representations are constantly on the tip of our minds—i.e., chronically accessible—compared with others. These representations require very little input from the environment to be activated and might even color perceptions of a new person in the absence of any cues pertaining to this representation. For example, research by Andersen and colleagues (Andersen, Glassman, Chen, & Cole, 1995) showed that perceivers still attributed

some characteristics of a significant other to a new person even when this person did not share any characteristics with the significant other.

Overview of the empirical chapters

Mental representations of unknown others play a central role in person perception. However, the antecedents and consequences of these representations at different stages of relationship formation and functioning—from evaluating unknown others to getting acquainted with these individuals—are yet to be fully understood. For example, does objective facial resemblance to significant others color impressions about unknown others? How does this idiosyncratic facial cue influence person perception when it is simultaneously processed with a shared facial cue? To what extent do evaluations of others based on static photographs of faces predict evaluations following live interactions? The present studies aim to address these questions.

Chapter 2 (published in the Journal of Experimental Social Psychology; Günaydin, Zayas, Selcuk, & Hazan, 2012) focuses on idiosyncratic cues pertaining to representations of romantic partners and investigates whether novel faces resembling one's own romantic partner (vs. another participants' partner) are judged more favorably, even when perceivers are not consciously aware of the idiosyncratic cue. In day-to-day person perception, such idiosyncratic cues are encountered simultaneously with cues that are shared across perceivers. Thus, Chapter 3 investigates in three studies how resemblance to various known others (an idiosyncratic cue) and facial WHR (a shared cue) simultaneously influence person perception. In addition, research described in Chapter 3 is the first examining whether the effect of shared cues can be altered by idiosyncratic experiences. Specifically, this research investigates whether having a romantic partner with a wider face can attenuate the negative association between facial WHR and trustworthiness.

Research on first impressions speaking to mental representations of unknown others has predominantly focused on static photographs of faces. Whether judgments based on photographs are significantly associated with judgments following face-to-face interactions is yet to be

empirically tested. A significant association between judgments based on photographs and those following live interactions would suggest that both types of judgments are informed by similar cues pertaining to facial appearance. Chapter 4 addresses this possibility in two studies investigating whether participants' evaluation of unknown individuals based on photographs predicts their judgments after interacting face to face with these individuals, even when the interaction provides opportunities to get to know the other person. Finally, Chapter 5 discusses directions for future research.

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CHAPTER 2

I LIKE YOU BUT I DON'T KNOW WHY: OBJECTIVE FACIAL RESEMBLANCE TO SIGNIFICANT OTHERS INFLUENCES SNAP JUDGMENTS

When a new person shares attributes with a significant other (SO), the mental representation of the SO is spontaneously activated, and is used to evaluate the new person—a phenomenon referred to as transference (Andersen & Chen, 2002). In the original transference work (Andersen & Baum, 1994; Andersen & Cole, 1990), participants who read written descriptors of a new person sharing some attributes with a SO evaluated this new person favorably and in ways consistent with the SO representation.

But, often the first information we receive about a new person isn't a written descriptor, but a snapshot of their physical appearance. To date only two studies (Kraus & Chen, 2010; White & Shapiro, 1987) have investigated whether *perceived* facial resemblance between a SO and an unknown other triggers transference. Both studies consisted of a "stimulus selection phase" in which participants identified from a collection of photographs individuals who bore high resemblance to a previously named SO. Later, at an ostensibly unrelated "test phase," participants evaluated a new person who either resembled a SO (i.e., an individual they had identified in the selection phase) or a yoked participant's SO. Participants who learned about a new person who resembled a SO (compared to a yoked participant's SO) evaluated the new person more positively, described themselves in ways consistent to when they are with the SO, and inferred that the new person possessed attributes similar to the SO (Kraus & Chen, 2010; White & Shapiro, 1987).

Although this work provides compelling evidence that *perceived* facial resemblance between a new person and a SO can lead to facially-triggered transference, it does not speak to whether *objective* facial resemblance does; both studies relied on subjective methods to create facial similarity. Because subjective judgments about facial resemblance do not necessarily reflect objective resemblance, past work leaves open the possibility that participants' choices at

the selection phase were not determined merely by facial similarity to the SO but by other factors as well. For example, individuals tend to view close others more positively (e.g., Gagne & Lydon, 2004; Murray, Holmes, & Griffin, 1996) and as more attractive (Epley & Whitchurch, 2008), than they actually are. Thus, when participants in past studies were instructed to evaluate the novel faces based on their physical resemblance to the SO at the selection phase, they may have been motivated to select novel persons whom appeared to possess desirable attributes, including attractiveness, even though there may not have been objective facial resemblance. As a result, later evaluations could have been driven by liking and inferences at the selection phase, rather than activation of the specific SO representation at the test phase. Thus, manipulating objective resemblance would provide stronger evidence for facially-triggered transference. This is a primary aim of the present study.

The fact that past work has relied on subjective reports of facial resemblance is also relevant to our second aim. According to the theory, transference effects should occur without conscious awareness (e.g., Andersen, Reznik, & Glassman, 2005). Support for this proposition has been obtained by presenting written descriptors of the new person outside of conscious awareness (Glassman & Andersen, 1999). It is less clear, however, whether the same is true for facially-triggered transference, especially in situations in which the face is consciously perceived, even though the facial resemblance to the SO is not (e.g., Bauer, 1984; Tranel & Damasio, 1985). Past work did not directly ask participants at the test phase whether the new person resembled someone whom they knew, but used general probes of suspicion, which may not have adequately captured subjective awareness. So it is still not known whether facial similarity between the new person and the SO can lead to transference in the absence of awareness of the resemblance. If it can occur without awareness, it would not be amenable to conscious control (e.g., Debner & Jacoby, 1994: Merikle, Smilek, & Eastwood, 2001). This would provide strong evidence for the automaticity of facially-triggered transference effects.

Present Research

Does *objective* resemblance between a novel person and a SO lead to facially-triggered transference? If so, can facially-triggered transference occur without awareness of the resemblance? To address these questions, we recruited romantic couples and took their photographs in an initial session. We used morphing techniques to digitally combine the photographs of the partner with photographs of unknown others, creating twelve novel faces all of which resembled the partner. In this way, we objectively manipulated each novel person's facial resemblance to partners and eliminated potential confounds (e.g., selection biases) that may have been present in previous work.

In an ostensibly separate study, we assessed facially-triggered transference. To minimize participants' awareness of the resemblance and to assess more automatic processes, we developed a unique method for assessing transference, which significantly departs from previously used methods. Specifically, we used a within-subjects design in which participants made a total of 144 snap judgments about 24 unknown others, 12 of which resembled the partner. Each novel face was presented for only 500 ms (e.g., Willis & Todorov, 2006) and evaluated on six traits (e.g., trustworthy). Given that individuals automatically evaluate partners positively (e.g., Zayas & Shoda, 2005), we predicted that novel faces resembling the partner (vs. not) would be judged as more likely to possess positive traits—evidence of facially-triggered transference.

Because our claim is that facially-triggered transference arises from activating the specific SO representation, we aimed to provide evidence against a familiarity account (e.g., Zajonc, 1968, 1980). That is, transference effects may arise as a result of exposing individuals to familiar targets and this feeling of familiarity (rather than activating the specific SO representation) may elicit positive evaluations. By recruiting couples who had been together for at least one year, we essentially controlled for familiarity across couples—i.e., all couples should be well exposed to their partners after one year. Therefore, if facially-triggered transference arises from activating the specific representation, then individuals highly satisfied in their

relationships, who have more positive representations of their partner (e.g., Murray et al., 1996; Zayas & Shoda, 2005), should evaluate novel faces resembling the partner (vs. those who do not) more positively (e.g., Andersen & Baum, 1991).

To investigate whether facially-triggered transference can occur in the absence of awareness, we directly assessed participants' awareness of the resemblance using both subjective and objective methods, which tap different aspects of consciousness (Cheesman & Merikle, 1984; Wiens, 2007). Specifically, participants indicated whether the novel faces reminded them of anyone whom they knew (subjective awareness) and discriminated between faces that resembled the partner vs. those that did not in a forced-choice task (objective awareness).

Lastly, we explored whether transference effects would vary by gender. Although past work on transference has not reported gender differences (e.g., Kraus & Chen, 2010), the present methodology employs a subtler manipulation of facial resemblance—by using morphing techniques and by presenting each photograph for 500 ms. Given that women are more perceptive of subtle facial cues (e.g., McBain, Norton, & Chen, 2009), they might respond more strongly to subtle cues of facial resemblance—leading to gender differences in facially-triggered transference.

Method

Participants

Thirty heterosexual couples (*Mean* age=21 years, *SD*=2.82; relationship length=12-132 months) participated in the study. One couple withdrew from the study and one male participant's data were lost, leaving 57 participants.

Measures and Procedure

In session-1, participants completed the Perceived Relationship Quality Components Inventory-short form (Fletcher, Simpson, & Thomas, 2000) using a 7-point (*Not at all* to *Extremely*) scale (α=.79, *M*=6.13, *SD*=.64). Participants then posed for a headshot (hair pulled back, jewelry/glasses removed) with a neutral expression.

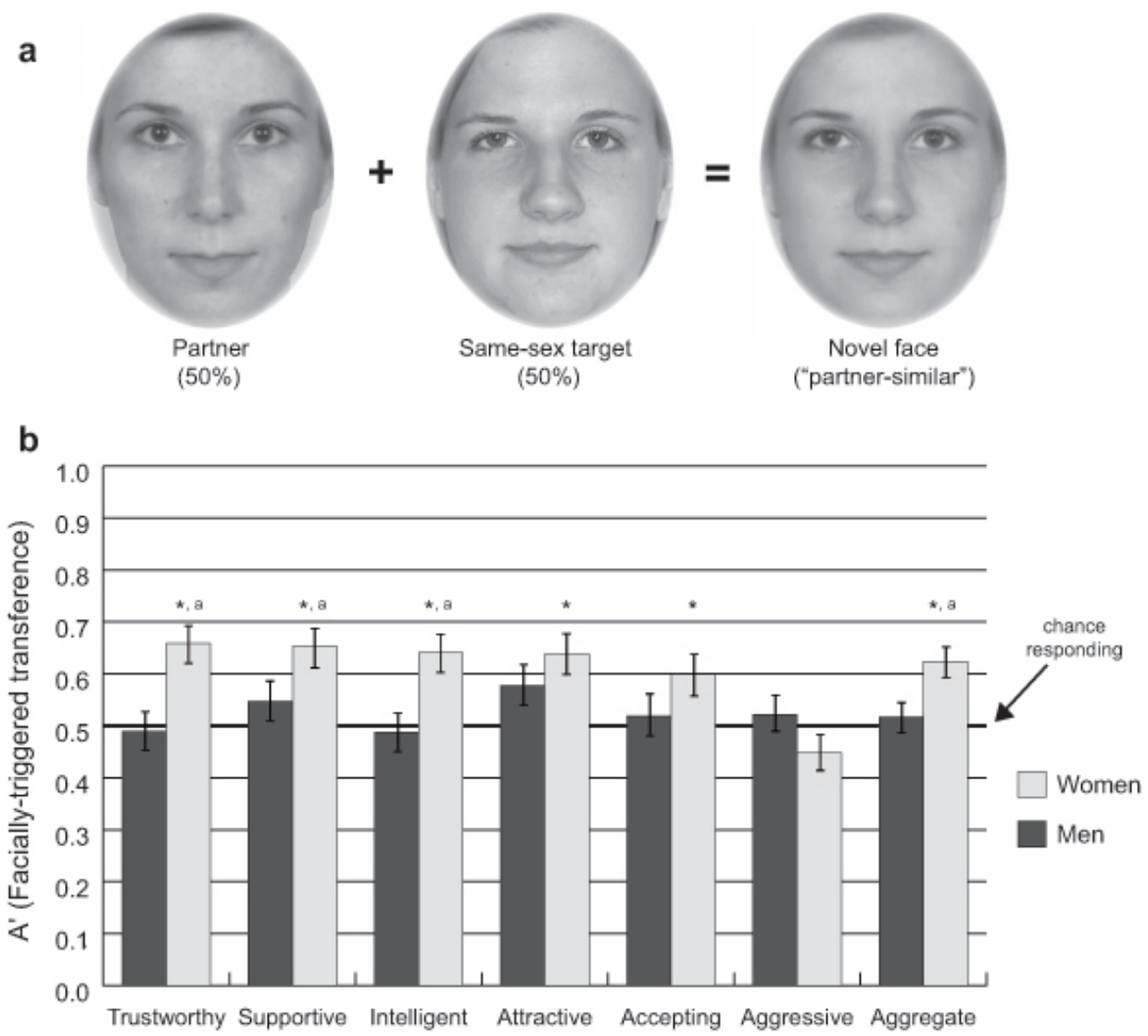

Figure 2.1. Example of the morphing procedure used to digitally combine 50% of the partner's photograph with 50% of the photograph of a same sex target to produce a novel face resembling the partner ("partner-similar") (a), facially-triggered transference, reflected by mean $A'_{aggregate}$, and the tendency to judge partner-similar faces as possessing a particular trait, reflected by mean A′s for individual traits, for women and men separately (b). The morphing procedure described in panel (a) was repeated 12 times, morphing the partner's photograph with 12 different same-sex faces. This procedure was also used to produce the yoked-similar faces, which served as control stimuli; the yoked participant's partner's face was morphed 12 times, each with one of 12

different same-sex faces. In panel (b), A' is a sensitivity measure adjusted for response bias. The bolded line marking A' at .5 reflects chance responding—i.e., no tendency to judge partner-similar (vs. yoked-similar) faces as possessing the trait. An A′ significantly greater than .5 indicates a tendency to judge partner-similar faces as possessing the trait (i.e., accepting, aggressive, attractive, intelligent, supporting, trustworthy). $A'_{aggregate}$—reflecting the transference effect—was derived by reverse scoring aggressiveness, and computing the mean A' for the six trait judgments. Bars marked with an "*" are significantly ($p<.05$) higher than .5. Bars marked with an "a" indicate that women's A′ values are significantly ($p<.05$) higher than men's A′ values. Error bars represent 1 standard error ± the mean.

To create stimuli, we paired couples and created yoked pairs between same-sex participants. We morphed the partner's photograph with each of 12 of 24 same-sex faces compiled from databases (Tottenham et al., 2009; Minear & Park, 2004) to create 12 "partner-similar" faces (50% partner's face+50% same-sex face; see Figure 2.1). Similarly, we morphed the yoked participant's partner's face with each of the remaining faces to create 12 "yoked-similar" faces. Because each yoked pair saw the same faces, peculiarities in stimuli were controlled entirely.

In session-2 (2-4 weeks after session-1), participants made snap judgments of each novel face (12 partner-similar, 12 yoked-similar) on six traits (accepting, aggressive, attractive, intelligent, supporting, trustworthy). Each trial consisted of a fixation cross (1000 ms), a face (500 ms), and a question (e.g., Is this person trustworthy?), which remained on the screen until participants indicated "yes" or "no" by pressing "D" or "K." Response keys ("yes" on left vs. right) were counterbalanced across participants. Trials were randomly presented except that the same face or the same trait question did not appear on consecutive trials.

After the snap judgment task, as a measure of subjective awareness of the resemblance, participants reported whether the novel faces resembled anyone whom they knew, and if yes, whom the faces resembled. We identified those participants who reported that one or more of the faces reminded them of their partner as subjectively aware. After debriefing, a subset of participants (N=46; 24 females) completed an objective awareness task identical to the snap judgment task except that participants indicated whether each face resembled their partner or not.

To index the extent to which participants judged partner-similar (vs. yoked-similar) faces as possessing a trait, we computed A′ (Snodgrass & Corwin, 1988) for each of the six trait judgments. A′ reflects the extent to which an individual discriminates between two options while taking into account response biases. It is conceptually similar to examining proportion of trials in which partner-similar faces were judged to possess a trait (relative to yoked-similar faces). An A′ of .5 reflects chance responding, and an A′ significantly greater than .5 reflects the tendency to judge partner-similar (vs. yoked-similar) faces as possessing a trait. We averaged all six A′s

(reverse scoring $A'_{aggressiveness}$) to index *facially-triggered transference* ($A'_{aggregate}$; α=.88). An $A'_{aggregate}$ significantly greater than .5 indicates a tendency to evaluate partner-similar faces more positively than yoked-similar faces. We also computed sensitivity to discriminate partner-similar from yoked-similar faces in the objective awareness task ($A'_{awareness}$). We adjusted for interdependency among data points arising from the nested data using linear mixed models (see Section S1 in Supplementary Material available online for methodological details).

Results and Discussion

The present study showed that *objective* resemblance to the SO—created by morphing the SO's photograph with unknown faces—can give rise to facially-triggered transference, as reflected by an $A'_{aggregate}$ that was above chance (t(28.22)=2.95, p<.01, d=.55). This effect, however, was qualified by participant's sex (t(27.99)=2.83, p<.01, d=.75). Whereas women judged partner-similar (vs. yoked-similar) faces more positively (t(52.38)=4.11, p<.001, d=.87), men did not (t<1, d=.12). Given that the novel faces were presented for only 500 ms, the findings suggest that facial resemblance to a SO can be processed efficiently from subtle cues, and still influence judgments about others automatically, spontaneously, and effortlessly. Importantly, relationship quality[1], for both men and women, was related to more positive snap judgments of partner-similar faces (t(42.07)=2.09, p<.05). The fact that individuals highly satisfied in their relationships, who have more positive partner representations, evaluated novel faces that resembled the partner more positively, suggests that facially-triggered transference arises from activating the specific SO representation rather than familiarity.

The results support the idea that resemblance to a SO can affect snap judgments of unknown others without awareness. In other words, facially-triggered transference occurred for women even when the 14 participants (9 females) who expressed subjective awareness of the resemblance (t(40.95)=3.23, p<.01, d=.81) were excluded from the analyses, and even when statistically controlling for objective awareness (t(22)=3.67, p<.01, d=.96; see Section S2 in

[1] Relationship quality did not significantly vary by gender (t<1).

Supplementary Material available online for additional analyses). These results are consistent with research showing that individuals can display implicit memory for familiar faces without explicit memory (e.g., Bauer, 1984; Tranel & Damasio, 1985).

One of the novel findings of the present research is that women showed facially-triggered transference to a greater extent than men. Although gender differences in transference effects are uncommon, the present findings are consistent with other work showing that women, compared to men, are more sensitive to subtle facial (e.g., McBain et al., 2009) and relational cues (e.g., Cross & Madson, 1997), and process visual information more thoroughly (Guillem & Mograss, 2005). Women's detailed elaboration of visual content might lead them to give more weight to subtle cues of resemblance with a SO, whereas men might lend more weight to their prior knowledge about the facial characteristics of a trustworthy person (e.g., Meyers-Levy & Maheswaran, 1991). Although speculative, the fact that the present study observed sex differences while previous work (e.g., Kraus & Chen, 2010) did not suggests that making the resemblance more salient—by using subjective methods to create resemblance and providing an indefinite amount of time to view the photograph—was necessary for producing transference effects in men; women, on the other hand, could detect even subtle cues of facial resemblance and use those cues in person perception.

A major strength of the present study is utilizing a within-subjects design assessing snap judgments of 24 different novel persons, 12 of which resembled the partner and 12 that did not. Compared to past work that has relied on between-subjects designs in which participants viewed *one* photograph of *either* a person who resembled the SO *or* someone who did not, the use of multiple stimuli in the present study makes it unlikely that an idiosyncratic feature of the partner's face, or of the novel face, is driving the effects, increasing the validity and generalizability of the current findings (e.g., Fiedler, 2011). Moreover, the use of morphing techniques to manipulate facial resemblance circumvents potential confounds (e.g., selection biases at the stimulus selection phase). Thus, it provides a stronger test of the hypothesis that facial resemblance to the SO can influence judgments automatically and without awareness.

The present findings support the claim that facial resemblance of a novel other (with a SO) can activate the SO representation, which in turn leads to more favorable snap judgments of the novel person. Alternatively, could the effects have emerged in the absence of activating the specific partner representation? Because individuals may like their partner's facial features, exposure to the partner-similar features, rather than the activation of the specific partner representation, might have elicited more positive evaluations. Research and theorizing about face recognition suggests that this is unlikely. Seeing facial features or exceedingly different poses of a known other spontaneously activates abstract knowledge about that particular person as reflected by activation of neural regions involved in spontaneous retrieval of person knowledge and emotional responses (e.g., Gobbini & Haxby, 2007; Quiroga et al, 2005). In the same manner, partner-similar facial features should activate the partner representation. Future work should obtain direct evidence, however, by assessing the transference of attributes associated with the specific SO representation.

By systematically manipulating objective resemblance using morphing techniques, the present research is the first to quantify facial resemblance and to show that objective facial resemblance to a SO influences snap judgments of novel persons in the absence of conscious awareness of the resemblance. Moreover, facially-triggered transference appears to arise from activating the specific SO representation rather than familiarity. These findings are consistent with extensive research showing dissociations between implicit vs. explicit memory, and indicate that facially-triggered transference can influence person perception spontaneously and automatically.

Supplementary Material

S1 Methodological Details

Participants

The sample was 80% Caucasian, 16.7% Asian or Asian American, and 3.3% from other ethnic backgrounds. All but six of the yoked pairs were matched on ethnicity. Results excluding the unmatched pairs did not differ substantially from those reported here.

None of the participants had distinctive facial hair or markings.

Measures and Procedures

Assessing Facially-Triggered Transference using A′. We indexed the extent to which participants were likely to judge partner-similar (vs. yoked-similar) faces as possessing a trait by computing A′. Partner-similar faces were assigned as the "signal" and yoked-similar faces were assigned as the "noise." For example, partner-similar faces were counted as a "hit" if they were judged as trustworthy. Accordingly, yoked-similar faces were counted as a "false alarm" if they were judged as trustworthy. Using the hit and false alarm rates, we calculated A′ scores (Snodgrass & Corwin, 1988) for each of the six traits (i.e., trustworthy, supportive, intelligent, attractive, accepting, aggressiveness). Chance responding (i.e., no tendency to judge partner-similar (vs. yoked-similar) faces as more likely to possess a trait) is indexed by an A′ of .5. An A′ significantly (p<.05) greater than .5 indicates a tendency to evaluate partner-similar faces as more likely to possess the trait than yoked-similar faces. Finally, we averaged all six A′s (after reverse scoring $A'_{aggressiveness}$) to index *facially-triggered transference* ($A'_{aggregate}$; α=.88). An $A'_{aggregate}$ significantly (p<.05) greater than .5 indicates a tendency to evaluate partner-similar faces more positively than yoked-similar faces.

Additional Information on Data Analysis. We first paired couples (henceforth called "dyads") and formed "couple pairs." We then created yoked pairs between same-sex participants. Because data points for each participant were nested within dyads, which were further nested within couple pairs, we used linear mixed models (LMMs) to account for interdependency

among data points. Dyad and couple pair were included in the model as random variables and sex was included as a fixed variable.

We ran separate LMMs for $A'_{aggregate}$ and A′ scores for each of the six traits. We obtained the mean estimates for A′ from the LMMs, therefore, statistically controlled for the nested design. We conducted one-sample *t*-tests on these estimates, comparing each to the chance level of .5 (see Table 2.1). LMMs in SPSS use Satterthwaite's (1946) approximation to estimate the degrees of freedom associated with the intercept and slopes, resulting in non-integer degrees of freedom.

S2 Additional Analyses

Calculating Effect Sizes

There is no established method of calculating effect sizes for complex non-independent designs such as the LMMs used in the present study (Klein, 2004). However, to give the reader a general sense of the magnitude of the effects, we calculated the effect size in units of residual variation, estimated by the full model. Our estimate of effect size is equivalent to Cohen's *d*, except that we used the residual standard deviation. Specifically, we estimated the effect size using the following formulas:

For comparing a sample mean to chance: d=(Estimated mean-0.5)/SD_{res}

For comparing two sample means: d=(Estimated $mean_1$-Estimated $mean_2$)/SD_{res}

where SD_{res} is the residual standard deviation—i.e. the square root of the error variance.

Assessing Facially-Triggered Transference in the Absence of Awareness of the Resemblance

Subjective awareness. Subjective methods of awareness indicated that 14 participants (9 female) expressed awareness of the resemblance between the novel faces and their partner. For these participants, facially-triggered transference, as reflected by $A'_{aggregate}$, was .61, compared to .56 for those who did not. When we entered subjective awareness as a factor in the model (0=awareness; 1=no awareness) predicting $A'_{aggregate}$, neither the main effect of subjective awareness nor its interaction with sex was statistically significant (*t*s<1). Critically, when we

excluded participants who expressed subjective awareness, $A'_{aggregate}$ remained significantly above chance for women (M=.62, t(40.95)=3.23, p<.01) and at chance for men (M=.50, t<1) (see Table 2.2).

Objective awareness. A subset of participants (n=46) completed a measure of objective awareness that reflects the sensitivity to consciously discriminate partner-similar faces from yoked-similar faces, indexed by $A'_{awareness}$. Objective awareness was above chance for both women (M=.84; t(45)=9.28, p<.001, d=1.89) and men (M=.80; t(45)=7.99, p<.001, d=1.67), and did not significantly differ (t<1) between the genders. We included $A'_{awareness}$ and its interaction with sex in LMMs (along with dyad, couple pair, and sex). The interaction between sex and $A'_{awareness}$ was statistically significant (b=.62, t(40.17)=2.34, p<.05), which indicated that objective awareness was related to $A'_{aggregate}$ for women (b=.69, t(22)=3.49, p<.01), but not for men (t<1). $A'_{aggregate}$ was also stronger for women than for men (t(39.48)=1.96, p=.06).

Because the relation between awareness ($A'_{awareness}$) and transference effects ($A'_{aggregate}$) varied for men and women, we ran two separate LMMs, one for women and one for men, to statistically control for $A'_{awareness}$. One-sample t-tests were performed using the estimated means and standard errors to compare the means to chance (.5). $A'_{aggregate}$ remained significantly above chance for women (M=.61, t(22)=3.67, p=.001) and at chance for men (M=.52, t<1), after controlling for $A'_{awareness}$. We followed the data analytic techniques described above to investigate facially-triggered transference for each individual trait while statistically controlling for objective awareness (see Table 2.3).

Finally, participants who expressed subjective awareness performed significantly (p<.05) better on the measure of objective awareness ($A'_{awareness}$=.92) than those who did not (M=.78). However, when participants who expressed awareness were excluded from the analyses, the results controlling for $A'_{awareness}$ did not differ substantially from those reported in Table 2.3.

Tables

Table 2.1. Tendency to judge partner-similar (vs. yoked-similar) faces as possessing a particular trait, reflected by mean A′ scores for each of the six trait judgments and their aggregate (i.e., facially-triggered transference), for women and men.

	Women's A'				Men's A'				Women's A' compared to men's	
	Mean	SE	*t*	*p*	Mean	SE	*t*	*p*	*t*	*p*
Trustworthy	0.66	0.04	4.23	0.0003	0.49	0.04	-0.27	0.7877	3.88	0.0006
Supportive	0.65	0.04	3.91	0.0003	0.55	0.04	1.19	0.2412	2.33	0.0275
Intelligent	0.64	0.04	3.70	0.0005	0.49	0.04	-0.31	0.7574	3.31	0.0026
Attractive	0.64	0.04	3.41	0.0012	0.58	0.04	1.91	0.0621	1.09	0.2854
Accepting	0.60	0.04	2.35	0.0223	0.52	0.04	0.45	0.6558	1.33	0.1893
Aggressive	0.45	0.04	-1.44	0.1551	0.52	0.04	0.62	0.5409	-1.45	0.1530
Aggregate[a]	**0.62**	**0.03**	**4.11**	**0.0001**	**0.52**	**0.03**	**0.54**	**0.5895**	**2.83**	**0.0085**

N = 57.

Notes. A' is a sensitivity measure adjusted for response bias. An A' of .5 reflects chance responding. An A' significantly greater than .5 reflects the tendency to judge partner-similar (vs. yoked-similar) faces as possessing the trait. *P*-values indicate the probability that A' was significantly greater than .5. [a]Aggregate—reflecting the facially-triggered transference effect—was computed by reverse scoring aggressiveness, and computing the mean A' for the six trait judgments.

Table 2.2. Tendency to judge partner-similar (vs. yoked-similar) faces as possessing a particular trait, reflected by mean A′ scores for each of the six trait judgments and their aggregate (i.e., facially-triggered transference), for women and men, including only participants who did *not* express subjective awareness of the resemblance.

	Women's A'				Men's A'				Women's A' compared to men's	
	Mean	SE	*t*	*p*	Mean	SE	*t*	*p*	*t*	*p*
Trustworthy	0.67	0.05	3.62	0.0011	0.46	0.05	-0.94	0.3549	3.54	0.0016
Supportive	0.65	0.05	2.96	0.0051	0.56	0.05	1.37	0.1790	1.45	0.1636
Intelligent	0.61	0.05	2.27	0.0288	0.47	0.04	-0.61	0.5423	2.25	0.0331
Attractive	0.63	0.05	2.44	0.0193	0.56	0.05	1.26	0.2166	0.93	0.3602
Accepting	0.64	0.05	2.72	0.0095	0.51	0.05	0.20	0.8432	1.90	0.0711
Aggressive	0.45	0.04	-1.23	0.2241	0.55	0.04	1.26	0.2157	-1.76	0.0858
Aggregate[a]	**0.62**	**0.04**	**3.23**	**0.0025**	**0.50**	**0.04**	**0.07**	**0.9467**	**2.46**	**0.0218**

N = 43.

Notes. A' is a sensitivity measure adjusted for response bias. An A' of .5 reflects chance responding. An A' significantly greater than .5 reflects the tendency to judge partner-similar (vs. yoked-similar) faces as possessing the trait. *P*-values indicate the probability that A' was significantly greater than .5. [a]Aggregate—reflecting the transference effect—was computed by reverse scoring aggressiveness, and computing the mean A' for the six trait judgments.

Table 2.3. Tendency to judge partner-similar (vs. yoked-similar) faces as possessing a particular trait, reflected by mean A′ scores for each of the six trait judgments and their aggregate (i.e., facially-triggered transference), for women and men, statistically controlling for objective awareness of the resemblance.

	Women's A' compared to chance				Men's A' compared to chance				Women's A' compared to men's	
	Mean	SE	*t*	*p*	Mean	SE	*t*	*p*	*t*	*p*
Trustworthy[b]	0.65	0.04	3.96	0.0007	0.50	0.04	0.10	0.9243	1.95	0.0586
Supportive	0.63	0.04	3.00	0.0047	0.53	0.04	0.67	0.5073	0.79	0.4372
Intelligent[b]	0.63	0.04	3.50	0.0021	0.48	0.04	-0.49	0.6292	2.28	0.0287
Attractive	0.62	0.04	2.88	0.0063	0.59	0.04	1.99	0.0530	1.34	0.1872
Accepting[b]	0.57	0.05	1.36	0.2001	0.52	0.05	0.45	0.6606	2.04	0.0481
Aggressive	0.45	0.04	-1.26	0.2127	0.49	0.04	-0.32	0.7482	-0.93	0.3568
Aggregate[a,b]	**0.61**	**0.03**	**3.67**	**0.0014**	**0.52**	**0.04**	**0.46**	**0.6482**	**1.96**	**0.0572**

$N = 46$.

Notes. A' is a sensitivity measure adjusted for response bias. An A' of .5 reflects chance responding. An A' significantly greater than .5 reflects the tendency to judge partner-similar (vs. yoked-similar) faces as possessing the trait. *P*-values indicate the probability that A' was significantly greater than .5. [a]Aggregate—reflecting the transference effect—was computed by reverse scoring aggressiveness, and computing the mean A' for the six trait judgments. [b]For traits marked, the interaction between sex and $A'_{awareness}$ was statistically

significant. So for these traits, separate linear mixed models were run for women and men to obtain estimated means and standard errors reported in the table. These means were then compared to chance by conducting one-sample *t*-tests.

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CHAPTER 3

THE ROLE OF SHARED AND IDIOSYNCRATIC FACIAL CUES IN PERSON PERCEPTION: CATEGORICAL VERSUS EVALUATIVE JUDGMENTS

A fundamental problem we are continuously faced with in everyday person perception is whether an unknown individual is a friend or a foe, trustworthy or untrustworthy, likeable or unlikeable. To resolve this problem, we simultaneously process a multitude of social cues including—but not limited to—a person's social category membership (e.g., gender, ethnicity) as well as more subtle facial characteristics (e.g., babyfacedness, facial width-to-height ratio, resemblance to known others). Past work has revealed considerable agreement across observers in judgments of facial appearance and has identified shared facial cues—such as facial width-to-height ratio, babyfacedness, and emotionally expressive features—that inform these judgments (e.g., Dotsch & Todorov, 2012; Carre, McCormick, & Mondloch, 2009; Oosterhof & Todorov, 2008; Said, Sebe, & Todorov, 2009; Willis & Todorov, 2006; Zebrowitz & Montepare, 2008). However, shared cues provide only half of the story. The other half is the idiosyncratic cues, or cues that are only relevant "in the eye of the beholder,"—such as facial resemblance to known others—which lead judgments to vary across perceivers (e.g., Günaydin, Zayas, Selcuk, & Hazan, 2012; Gawronski & Quinn, 2013; Kraus & Chen, 2010; Verosky & Todorov, 2010; 2013).

Although shared and idiosyncratic cues are simultaneously encountered when perceivers make sense of others in everyday life, they have so far been studied separately. Given shared and idiosyncratic cues are equally powerful predictors of judgments of unknown individuals (Hönekopp, 2006), it is essential to investigate how these cues influence, jointly or independently, person perception when both cues are presented to participants simultaneously. A major aim of the present studies was to fill this important gap in the literature. Specifically, we investigated how resemblance to a known other (a widely studied idiosyncratic cue; e.g.,

Verosky & Todorov, 2010) and facial width-to-height ratio (a central shared cue; e.g., Carre et al., 2009) simultaneously affect judgments of unknown others.

A related question that has not received attention in prior work is under what conditions idiosyncratic and shared cues would have additive vs. interactive effects on judgments. Past research studying the effect of multiple cues has produced mixed findings—with studies examining evaluative judgments (e.g., evaluating whether a person is trustworthy; Verosky & Todorov, 2013) reporting additive effects and studies examining categorical judgments (e.g., indicating the gaze direction of a target person; Adams & Kleck, 2003) reporting interactive effects. Although these findings imply that type of judgment may be one factor influencing the effect of multiple cues, this issue has not been systematically investigated. Therefore, another aim of the present research was to examine whether idiosyncratic and shared facial cues lead to additive vs. interactive effects depending on the type of judgment made—evaluative (i.e, indicating impressions of unknown faces) vs. categorical judgments (i.e., indicating whether unknown faces resemble a known other).

Idiosyncratic Cues in Evaluation: Affective Generalization from Known Faces

Work focusing on idiosyncratic cues—cues in the eye of the beholder—has investigated how judgments vary across perceivers based on each perceiver's unique experiences. This work has shown that perceivers learn to associate behaviors of known others with their physical characteristics (e.g., Verosky & Todorov, 2010) and when an unknown individual is encountered who bears facial resemblance, associations about the known other generalize to the unknown individual. In other words, perceivers evaluate unknown persons that resemble known others (vs. those who do not) in ways consistent with the affective valence of the known other. Reading descriptive sentences suggesting that unknown others share personality attributes with (e.g., Andersen & Baum, 1994) as well as seeing that they bear facial resemblance to significant others (Kraus & Chen, 2010; White & Shapiro, 1987) can influence first impressions, even when perceivers are not consciously aware of the resemblance (Günaydin et al., 2012). This affective generalization can occur not only from significant others, such as one's partner, but also from

celebrities (Tanner & Maeng, 2012) and newly encountered people described to engage in positive, negative, or neutral behaviors (Gawronski & Quinn, 2013; Verosky & Todorov, 2010; 2013).

Research focusing on affective generalization from newly encountered people typically asked participants in a learning phase to study neutral faces presented from a frontal viewpoint, paired with positive, negative, or neutral behaviors. Then, in the evaluation phase, participants were presented with morphs resembling these learned faces, again presented from a frontal viewpoint. This work suggests that compared with a neutral baseline, novel faces resembling a "bad person" are evaluated more negatively whereas resemblance to a "good person" does not appreciably influence judgments (Verosky & Todorov, 2010; 2013; but see Gawronski & Quinn, 2013). One question that is left unanswered by this work is whether affective generalization can occur when stimulus conditions (e.g., orientation of faces, lighting conditions, facial expressions) during learning are different than those during evaluation. A key factor affecting the answer to this question is whether the representations of experimentally learned faces are abstract or view-independent—that is, whether representations of these faces can reliably be activated if they are subsequently encountered under novel stimulus conditions. On the one hand, research on spontaneous trait inferences suggests that representations of learned faces are abstract (Todorov & Uleman, 2004). In this work, participants were first asked to learn faces, each paired with a behavior (e.g., "Mary told the cashier that she got too much change.") implying a particular trait (e.g., honest). Participants were later shown face-trait pairs and were asked to identify which of the traits were presented in the learning phase. Perceivers were more likely to falsely recognize having seen a trait paired with a target person when the person was previously described to perform a behavior indicative (vs. not indicative) of that trait. Importantly, this false recognition effect was observed even when the orientation of faces at learning was different than their orientation at the recognition phase, although the effect got marginally weaker. The researchers took this as evidence that perceivers form abstract or view-independent representations of faces while spontaneously inferring traits from behavior.

On the other hand, there is work suggesting that representations of experimentally learned faces are far from being abstract (e.g., Patterson & Baddeley, 1977; Tong & Nakayama, 1999). For example, Patterson and Baddeley (1977) asked participants to learn unknown faces and then, in a recognition test, to indicate whether they saw the faces previously. Recognition performance was almost perfect when the faces had identical poses at the learning phase and the test phase. However, when the viewpoint or the emotional expression of the learned faces was altered, recognition performance significantly dropped (although it was still above chance). Given that changes in stimulus conditions have a profound influence on recognition of newly encountered individuals, it is possible that affective generalization effects might not be readily observed when stimulus conditions in learning and evaluation phases are different—for example when newly encountered individuals are studied from a profile view but faces resembling these individuals are evaluated from a frontal view. However, in past work, stimulus conditions in learning vs. evaluation were not systematically varied to examine this question.

Shared Cues in Evaluation: The Role of Facial Width-to-Height Ratio

Idiosyncratic cues are not the only pieces of information that perceivers use to decide who is good vs. bad. There are also shared cues—such as facial width-to-height ratio, babyish features, and emotionally expressive features—that lead different perceivers to arrive at similar evaluative judgments (e.g., Carre et al., 2009; Said et al., 2009; Zebrowitz & Montepare, 2008). A separate, and arguably more well-established, line of research on first impressions has focused on these shared factors.

A finding that has recently emerged from this work is that facial width-to-height ratio (WHR), which is the bizygomatic width of the face scaled for height, is positively related to male aggression (Carre & McCormick, 2008; Carre, et al., 2009), and is negatively related to judgments of male trustworthiness (Stirrat & Perrett, 2010). For example, Stirrat & Perrett found that individuals judged men with wider (vs. narrower) faces as less trustworthy. This lack of trust also had behavioral manifestations, with men with wider (vs. narrower) faces being entrusted with less money during an economic game.

It has been suggested that the effect of WHR on judgments of trustworthiness develops by observing a *covariation* between WHR and certain traits in men over time (Stirrat & Perrett, 2010). This account is supported by research showing that learned associations between a facial feature and a trait can influence judgments of novel faces that vary on that facial feature (Hill, Lewicki, Czyzewska, & Schuller, 1990). Specifically, participants exposed to long faced professors who were described as fair tended to later evaluate other long (vs. short) faced professors as more fair. The opposite was true for participants who were led to believe short faced professors were fair. This research suggests that perceivers can easily learn covariations between facial features and certain traits. Given prior work documenting a covariation between WHR and a number of behaviors signaling untrustworthiness—such as betraying the trust of others, deceiving others during negotiation, and cheating to enhance financial gain (Haselhuhn & Wong, 2012; Stirrat & Perrett, 2010)—it is possible that with continuous exposure to such behaviors performed by men with wider faces, perceivers are learning that WHR is a reliable cue of male trustworthiness.

Despite the strong evidence documenting an association between high WHR and low trustworthiness judgments, whether prior experience with wide-faced individuals moderates this association is yet to be investigated. For instance, do repeated favorable interactions with a wide-faced significant other attenuate the negative association between WHR and judgments of liking? No study so far has investigated this possibility.

Multiple Cues in Categorization and Evaluation: Interactive versus Additive Effects

Although research on shared and idiosyncratic cues each speaks to the factors that influence snap judgments, they have remained disconnected from one another. Yet, in daily life, both shared and idiosyncratic cues are simultaneously available when making sense of unknown others. Hence, getting a complete picture of person perception requires investigating how these cues simultaneously influence judgments of unknown others.

Past research studying the effect of multiple cues on person perception has produced mixed findings—with studies examining evaluative judgments (e.g., judging whether a person is

trustworthy; Verosky & Todorov, 2013) reporting additive effects and studies examining categorical judgments (e.g., indicating the gaze direction of a target person; Adams & Kleck, 2003) reporting interactive effects. Although these findings imply that type of judgment may be one factor influencing the effect of multiple cues, this issue has not been systematically examined. We propose that perceivers are likely to use multiple cues available to them in an additive fashion when they make evaluative judgments (e.g., good vs. bad). In contrast, when perceivers make categorical judgments (e.g., man vs. woman) based on a focal cue, the presence or absence of cues conveying conflicting information might influence how efficiently this cue is processed, producing interactive effects.

Indeed, past work asking perceivers to make social category judgments (e.g., happy vs. angry, male vs. female, white vs. black) showed that cues that are perceptually similar (e.g., a female face and a happy expression; Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007) or that signal similar intentions (e.g., a direct gaze and a happy expression; Adams & Kleck, 2003) interact to influence processing efficiency. For instance, there are perceptual similarities between a female face and a happy expression, and between a male face and an angry expression (Becker et al., 2007). When perceptually similar cues are simultaneously encountered, perceivers process these cues more efficiently, as indicated by faster and more accurate classification of angry expressions in male (vs. female) faces and happy expressions in female (vs. male) faces. Similarly, categorization of male (vs. female) faces was facilitated in the context of angry expressions whereas categorization of female (vs. male) faces was facilitated in the context of happy expressions.

In addition to having perceptual similarities, different facial cues might communicate similar intentions, which also lead to interactive effects in categorical judgments. For example, a direct gaze and emotions of anger and joy communicate an approach motivation whereas an averted gaze and emotions of sadness and fear communicate an avoidance motivation. Because of this similarity in underlying intentions, when perceivers were presented with faces with direct

(vs. averted) gaze, anger and joy expressions were categorized faster whereas fearful and sad expressions were categorized slower (Adams & Kleck, 2003; 2005).

Although interaction effects are often found when making categorical judgments, the picture is different when individuals are asked to make evaluative judgments (e.g., Verosky & Todorov, 2013). Now, the effects of multiple cues were found to be mostly additive. For instance, when evaluating ingroup vs. outgroup members, multiple cues indicating group membership led to predominantly additive effects, with the double ingroup evaluated most favorably, the double outgroup least favorably, and the mixed groups falling in between (for reviews see Crisp & Hewstone, 2007; Urban & Miller, 1998). Past work focusing on judgments of trustworthiness also revealed additive effects when facial cues indicating trustworthiness were simultaneously presented with behavioral information indicating trustworthiness (Rezlescu, Duchaine, Olivola, & Chater, 2012; Verosky & Todorov, 2013). Specifically, Rezlescu and colleagues (2012) asked participants to play an online economic game with unknown others. The only information available to participants was computerized faces of their opponents manipulated to look either trustworthy or untrustworthy as well as information about their opponents' reputation—whether they displayed trustworthy or untrustworthy behaviors in previous rounds of the game. Trustworthy- (vs. untrustworthy-) looking individuals as well as those with a good (vs. bad) reputation were entrusted more money during the economic game, with the result being that those with both trustworthy appearances and good reputations benefiting the most. Similarly, Verosky and Todorov (2013) provided evidence that multiple cues have additive effects on evaluative judgments. Specifically, participants first studied a person's face and read his biography indicating good, bad or neutral moral character. Then, they were presented with unknown individuals who bore resemblance to these moral agents and who were described to engage in positive, negative, and neutral behaviors. Their results showed that resemblance to the moral agents and valence of behaviors had additive effects on judgments of trustworthiness.

Based on prior work on categorical and evaluative judgments, we predicted that simultaneous presentation of an idiosyncratic cue—resemblance to a known other in this case—and a shared cue—facial WHR in this case—will have an interactive effect on categorical judgments and an additive effect on evaluative judgments. Given that resemblance to a known other and WHR both communicate trustworthiness, we expected that these two cues will interact to predict processing efficiency when participant are asked to categorize faces as resembling vs. not resembling a known other. In contrast, we predicted to observe additive effects of resemblance and WHR when participants are asked to judge whether the faces are likeable or not.

Overview of the Present Studies

The primary aim of the present research is to investigate how shared (facial WHR in this case) and idiosyncratic cues (facial resemblance to known others in this case) jointly or independently influence person perception. Toward this aim, we conducted three studies. In all studies participants were asked to make judgments of novel faces varying in WHR and manipulated to resemble a known other using morphing techniques. Unlike past work in which participants could view the faces for an indefinite amount of time before providing their judgments (e.g., Stirratt & Perret, 2010), the faces were presented for only 500 ms (e.g., Willis & Todorov, 2005) to investigate whether WHR would still influence judgments when processed simultaneously with facial resemblance to known others for a very short duration. Based on past work, we expected that shared and idiosyncratic cues will have interactive effects on categorical judgments whereas these cues will have unique, additive effects on evaluative judgments.

Study 1 focused on evaluative judgments and investigated how facial resemblance to a newly encountered individual (associated with positive, negative, or neutral behaviors) and WHR simultaneously influence snap judgments of liking. In addition, this study addressed an issue that was left unanswered in prior research by manipulating the orientation of the faces (frontal vs. profile) in the learning phase. This allowed us to test whether the match in stimulus

conditions (e.g., orientation of faces) in the learning and evaluation phases moderate the strength of the affective generalization effect.

Studies 2 and 3 focused on both evaluative and categorical judgments. In Study 2, participants were asked to complete a closeness generating interaction with a confederate to promote liking of a newly met acquaintance. Then, they completed a snap judgments task where they evaluated the likeability of novel faces resembling their new acquaintance (vs. not) and a separate categorization task where they categorized the novel faces in terms of whether the face resembles their new acquaintance or not.

In Study 3, we took advantage of positive associations that occur naturalistically in daily life by focusing on resemblance of novel faces to one's romantic partner. Similar to Study 2, evaluative judgments about partner-similar (vs. dissimilar) faces were assessed using a snap judgment task whereas categorical judgments regarding whether novel faces resembled the partner was assessed in a separate categorization task. Investigating the simultaneous effect of shared and idiosyncratic cues by recruiting romantic couples in Study 3 also allowed us to address another important question that is left unanswered by past work: Are the effects of shared cues altered by past experiences with close others? For example, if a perceiver's romantic partner has a higher WHR, does this person still respond negatively to unknown men with higher WHRs? Repeated favorable experiences with a wide-faced partner as well as the general tendency to associate partners with positivity (e.g., Zayas & Shoda, 2005) may over time reduce the strength of the association between high WHR and untrustworthiness. Thus, Study 3 investigated whether WHR is a less strong cue of trustworthiness for individuals who have a wide-faced partner.

Study 1

The primary aim of Study 1 was to investigate the extent to which perceivers' evaluative judgments are influenced by the simultaneous presence of shared and idiosyncratic cues. Accordingly, multilevel modeling was used to investigate, for each perceiver, the effects of WHR (i.e., a shared cue) and resemblance to newly encountered individuals (i.e., an

idiosyncratic cue) on evaluative judgments about novel target individuals. Using procedures validated by past work (Verosky & Todorov, 2010), associations about the novel individuals were experimentally created by repeatedly pairing 6 different individuals with positive, neutral, or negative behaviors in a learning phase. Then, in the evaluation phase, participants completed a snap judgment task (Günaydin et al., 2012) in which they evaluated 24 faces resembling these learned faces and varying on facial WHR. Male faces were used in the study, given that prior work documented the effects of WHR mainly for male faces (e.g., Stirrat & Perrett, 2010). Using multiple facial stimuli in a within-participants design allowed us to examine the extent to which first impressions of novel targets are affected by both WHR and similarity to a known other. We expected that facial WHR of novel faces would be negatively related to snap judgments of liking. Moreover, based on past work (Verosky & Todorov, 2010; 2013), we expected that compared with a neutral baseline, novel faces resembling a "bad person" would be evaluated more negatively whereas resemblance to a "good person" would not appreciably influence judgments.

We also investigated whether similarity in stimulus conditions between learning and evaluation phases would moderate the effect of the idiosyncratic cue. Unlike past work in which faces were presented from a frontal view during both learning and evaluation phases, the faces of the newly encountered people were presented from a frontal (0°) or a profile (45° or 135°) view in the learning phase to create either a match or a mismatch with the frontal orientation of novel faces in the evaluation phase. Based on past work suggesting that representations of experimentally learned faces are view-dependent—that is, they are activated less strongly under novel stimulus conditions (e.g., Patterson & Baddeley, 1977), we expected affective generalization to occur only when the stimulus conditions at learning match the stimulus conditions in which facial resemblance is processed. In other words, we expected to observe affective generalization only when both the learned face and the novel face are presented from a frontal viewpoint. However, if the learned face is studied from a profile view, but novel faces resembling the learned face are evaluated from a frontal view, the stimulus conditions at learning

do not match the stimulus conditions at evaluation. When there is such a mismatch in stimulus conditions, we expected the affective generalization effect to get weaker.

Method

Participants. Forty-four undergraduate students participated in the study. Four participants who failed to learn the associations between faces and behaviors in five or fewer rounds (see the Procedure and measures section for details) were excluded from the analyses, leaving 40 participants (*Mean* age=19.33 years, *SD*=1.25; 15 females).

Procedure and measures. In the learning phase, participants were asked to study face-behavior pairs using a paradigm developed by Verosky and Todorov (2010). Frontal (0°) and profile (45° and 135°) versions of six neutral faces with similar likability ratings were selected from the Radboud Face Database (Langner, Dotsch, Bijlstra, Wigboldus, Hawk, & van Knippenberg, 2010). In a within-participants design, three faces were presented from a frontal viewpoint and three faces from a profile (either 45° or 135°) viewpoint, each paired with five positive, neutral, or negative behaviors (taken from Fuhrman, Bodenhausen, & Lichtenstein, 1989). Orientation and valence of each face were counterbalanced across participants. Upon presentation of the face-behavior pair, participants were asked imagine the person engaging in the behavior as vividly as possible before moving on to the next trial. Participants had to view each face-behavior pair for at least 5 seconds before they were allowed to continue.

Next, we tested learning by asking participants to indicate whether each face was previously paired with positive, neutral, or negative behaviors. If participants gave an incorrect response, they were asked to repeat the learning trials, with each face paired with different behaviors of the same valence. Participants continued this procedure until they gave all correct responses or completed the learning trials eight times.

In the evaluation phase, participants completed a snap judgment task. They evaluated each of 24 faces on 5 traits aimed to assess favorable impressions (trustworthy, supportive, warm, honest, selfish). Each trial consisted of a fixation cross (1000 ms), a face (500 ms), and a question (e.g., Trustworthy?), which remained on the screen until participants indicated “yes” or

"no" by pressing "D" or "K." Trials were randomly presented except that the same trait question did not appear on consecutive trials. Responses to all five trait questions were averaged (after reverse scoring the trait selfish) to index snap judgments of liking for each novel face.

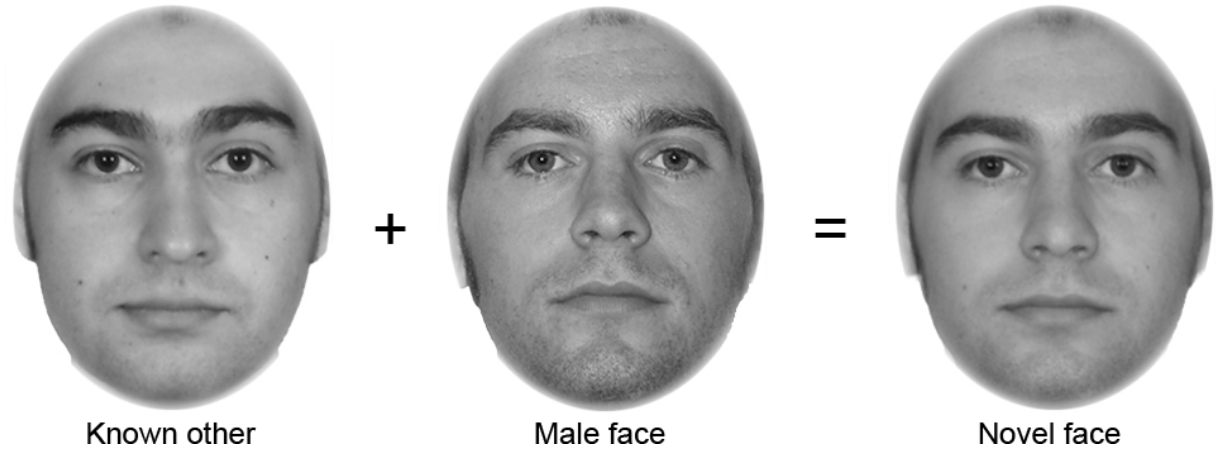

Figure 3.1. Example of the morphing procedure used to digitally combine the known person's photograph (an experimentally learned face in Study 1, a newly met acquaintance in Study 2, and a romantic partner in Study 3) with the photograph of a male target to produce a novel face resembling the known person.

To create stimuli for the snap judgment task, we used frontal versions of the learned faces. We compiled 6 sets of 4 male faces (total of 24 faces) from standard face databases (Tottenham et al., 2009; Minear & Park, 2004). Each learned face was morphed with faces in one of the 6 sets. (see Figure 3.1 for an example). Face sets used for morphing with each learned face were counterbalanced across participants. All morphs were converted to grayscale and equated for luminance using the SHINE toolbox (Willenbockel, Sadr, Fiset, Horne, Gosselin, & Tanaka, 2010) for MATLAB. To calculate facial WHR of each stimulus face in the snap judgment task, two raters independently measured the ratio of the bizygomatic width (i.e., the distance between the left and the right zygion) to the height (i.e., the distance between the upper lip and the upper eyelid) of each face following Stirrat and Perrett (2010). Since inter-rater agreement was very high (Cronbach's α = .99, r = .98), WHRs were averaged across raters to create a single index of WHR for each face.

Data analytic strategy. We used multilevel modeling (MLM; Raudenbush & Bryk, 2002) to estimate the effects of facial similarity and WHR at the level of facial stimuli. The level-1 model estimated, for each participant, a regression line predicting *snap judgment* of each novel face from the face's *orientation* (1 = frontal, 0 = profile), *similarity to the negative* learned face (1 = negative, 0 = positive, 0 = neutral), *similarity to the positive* learned face (0 = negative, 1 = positive, 0 = neutral), and *WHR* (standardized around the mean). We determined whether to estimate slopes as fixed or random using the procedures outlined by Hayes (2006)[2]. The level-1 equation was as follows:

Level-1 model

Equation 1.0

$$(snap\ judgment)_{ij} = \beta_{0j} + \beta_{1j}(orientation) + \beta_{2j}(similarity\ to\ negative) + \beta_{3j}(similarity\ to\ positive) + \beta_{4j}(WHR) + r_{ij}$$

where β_{0j} represents participant *j*'s mean judgment of an average-WHR face presented from a profile viewpoint and resembling the neutral face, β_{1j}, $\beta_{2j,}$ $\beta_{3j,}$ and β_{4j} represent, for each participant *j*, the effects of orientation, similarity to negative learned faces, similarity to positive learned faces, and WHR, respectively, and r_{ij} represents the residual error term[3].

The level-2 model estimated the average effects for the entire sample. The level-2 equations were as follows:

Level-2 model

[2] Across all studies, estimating a fixed slope for WHR provided a better fit. Estimating random slopes for variables pertaining to facial similarity provided better fit in all studies except Study 1. To maintain consistency, we estimated predictors pertaining to facial similarity as random across all studies. Nonetheless, estimating these predictors as fixed in Study 1 produced highly similar results.

[3] Given that each novel face is produced by morphing a learned face with an unknown face, an alternative method of modeling the data is to use the *identity of learned faces* and *identity of unknown faces* as random factors instead of using the *identity of novel faces* as a random factor. When the data were analyzed using this method, the variance component for identity of learned faces was not statistically different from zero (p = .18) and hence was dropped from the model. The model using identity of unknown faces as a random factor produced very similar results as reported in the text.

Equation 1.1

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

Equation 1.2

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

Equation 1.3

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

Equation 1.4

$$\beta_{3j} = \gamma_{30} + u_{3j}$$

Equation 1.5

$$\beta_{4j} = \gamma_{40}$$

where γ_{00} represents, for the entire sample, the mean judgment of an average-WHR face presented from a profile view and not resembling the neutral face, γ_{10}, γ_{20}, γ_{30}, and γ_{40} represent the average effect of orientation, similarity to negative, similarity to positive, and WHR, respectively, and u_{0j}, u_{1j}, u_{2j}, and u_{3j} represent the residual error terms.

Two-way and three-way interactions among orientation, similarity, and WHR were tested by adding the interaction terms to the model in separate MLMs. For example, the level-1 equation testing whether there was a two-way interaction between similarity to a negative face and orientation was as follows:

$$(\textit{snap judgment})_{ij} = \beta_{0j} + \beta_{1j}(\textit{orientation}) + \beta_{2j}(\textit{similarity to negative}) + \beta_{3j}(\textit{similarity to positive}) + \beta_{4j}(\textit{WHR}) + \beta_{5j}(\textit{similarity to negative} \times \textit{orientation}) + r_{ij}$$

The average effect of the interaction term in the sample was estimated by adding the following equation to level-2:

$$\beta_{5j} = \gamma_{50} + u_{5j}$$

All other interaction effects were tested using a similar approach.

Estimation of Standardized Coefficients

To give the reader a sense of the effect sizes, standardized coefficients were computed using the following formula (Snijders & Bosker, 1999).

standardized coefficient = [S.D.(X) / S.D.(Y)] * γ

where S.D.(X) and S.D.(Y) refer to the standard deviations of the predictor and the dependent variable, respectively, and γ is the effect of the predictor estimated by the MLM. Standardized coefficients can be interpreted similar to the beta coefficients estimated in linear regression—as the increase in the dependent variable (in standard deviations) produced by each additional standard deviation increase in the predictor.

Results and Discussion

The effect of facial WHR and resemblance to learned faces. Participants evaluated novel faces less favorably as WHR increased (γ_{40} = -.037, *SE* = .010, $p < .001$, *standardized coefficient* = -.110), showing that facial WHR can influence judgments even when novel faces are presented for a very short duration (i.e., 500 ms). Moreover, novel faces were evaluated less favorably when they resembled individuals associated with negative (vs. neutral) behaviors (γ_{20} = -.068, *SE* = .028, p = .019, *standardized coefficient* = -.095). Facial similarity to individuals associated with positive (vs. neutral) behaviors did not appreciably affect judgments (γ_{30} = -.040, *SE* = .026, p = .130, *standardized coefficient* = -.056). Finally, there was no significant evidence that the effect of WHR varied across levels of similarity to negative or to positive faces (ps > .752). These results extend past work by showing that shared and idiosyncratic cues have unique, additive effects on snap judgments of liking.

The effect of stimulus conditions on affective generalization. Next, we looked at whether the effect of the idiosyncratic cue is moderated by the match in stimulus conditions—in this case the match in orientation of faces—between learning and evaluation. Results revealed that resemblance to negative faces led to less favorable evaluations when the faces were studied from a frontal view in the learning phase, matching the orientation of the faces in the snap judgment task (γ = -.118, *SE* = .043, p = .009, *standardized coefficient* = -.165), but not when the faces were previously studied from a profile view (γ = -.017, *SE* = .034, p = .627, *standardized coefficient* = -.024). The interaction between orientation and similarity to negative faces was marginally significant (γ_{50} = -.101, *SE* = .054, p = .067, *standardized coefficient* = -.112). Neither

the interaction between orientation and similarity to positive faces (γ_{50} = .017, *SE* = .053, *p* = .745, *standardized coefficient* = .019) nor the three-way interactions between similarity to positive or negative faces, orientation, and WHR reached significance (*p*s > .888).

Overall, Study 1 provided the first evidence that when participants simultaneously encounter shared (e.g., facial WHR) and idiosyncratic cues (e.g., resemblance to a known other), these facial cues independently affect evaluative judgments of unknown others. Participants evaluated novel faces less favorably as WHR increased, even when the novel faces were presented as quickly as 500 ms. Moreover, novel faces resembling a negative (vs. neutral) known other was evaluated less favorably. However, this affective generalization effect occurred only when the orientation of the faces was matched in the learning and the evaluation phase (i.e., when faces were presented from a frontal viewpoint in both phases), suggesting that affective generalization from experimentally learned faces is view-dependent.

Consistent with past work (Verosky & Todorov, 2010; 2013), resemblance to a "good person" did not appreciably influence evaluative judgments. That is, there was no evidence that participants evaluated faces resembling the positive known other more favorably than faces resembling a neutral other. It is possible that forming positive associations about a newly encountered person might require more than presenting participants with positive descriptive sentences about unknown individuals. Research showing that affective generalization can occur from significant others who are represented positively (Günaydin et al., 2012; Chapter 2) suggests that the effect of the idiosyncratic cue might depend on personal significance of known individuals. Perhaps a face-to-face interaction involving disclosure of personal information would provide a more vivid, personally relevant way of forming positive associations about a newly met person, which, in turn might lead to affective generalization. Indeed, such interactions have been reliably used by past work to create feelings of rapport between two unacquainted individuals (Aron, Melinat, Aron, Vallone, & Bator, 1997).

Study 2

Study 2 used a closeness-generating interaction (Aron et al., 1997) to create positive associations about a newly met acquaintance in an ecologically valid way and assessed the unique and interactive effects of WHR (i.e., a shared cue) and resemblance to a known other (i.e., an idiosyncratic cue) on both evaluative and categorical judgments.

Following Study 1, we predicted to observe additive effects of WHR and resemblance to a newly met acquaintance on evaluative judgments (i.e., snap judgments of liking). Given in Study 1 we did not find appreciable evidence for affective generalization from a "good person" associated with praiseworthy behaviors, Study 2 employed a closeness-inducing live interaction, which is a more personally relevant and vivid way of forming positive feelings toward a newly encountered person. Live interactions also have the additional advantage of giving perceivers the opportunity to encode the newly encountered person's face in motion, which past work has shown facilitates face recognition (e.g., Thornton & Kourtzi, 2002; but see O'Toole, Roark, & Abdi, 2002). During a live interaction, a new person is encountered dynamically from multiple viewpoints, which, compared with static presentations of faces, gives perceivers greater opportunities to form an abstract, view-independent representation of the person (e.g., Pilz, Thornton, & Bülthoff, 2006). Hence, a live interaction that facilitates feelings of closeness and rapport among strangers appears to be a better test of whether positive associations about a newly encountered person can generalize to unknown others.

Past work showed interactive effects of multiple cues when perceivers made categorical judgments (e.g., Adams & Kleck, 2003). Based on this work, we predicted shared and idiosyncratic cues would interact when participants are asked to categorize faces based on whether or not they resemble the newly met acquaintance. Given that resemblance to a positive known other and high WHR signal conflicting information—the former signals trustworthiness and the latter signals untrustworthiness—we expected that participants would be slower and less accurate when the target face resembled their new acquaintance *but* had a high WHR.

Method

Participants. Thirty seven undergraduate students (*Mean* age=20.41 years, *SD*=1.67; 24 females) participated in the study.

Procedure and measures. The study was presented as consisting of two, ostensibly unrelated parts. In the first part, participants were told that the researchers were examining "first impressions in initial encounters." Participants had a 45-minute closeness generating interaction with one of two male confederates whom they were told was another participant. During the interaction, the participant and the confederate took turns in reading aloud intimacy-building questions and then answering each question[4]. Resembling the dynamics of relationship development in daily life, the questions were arranged such that the conversation evolved from topics that do not require much self-disclosure (e.g., Given the choice of anyone in the world, whom would you want as a dinner guest?) to those progressively requiring greater self-disclosure (e.g., "What is your most treasured memory?"). This procedure was shown to reliably generate feelings of closeness and intimacy toward a newly encountered person (Aron et al., 1997). After the interaction, participants completed four self-report items to assess how much they liked their new acquaintance (e.g., "In general, how positive is your impression of this person?"; 1 = *Not at all* to 7 = *Very*) and eight items to assess their willingness to engage in future interactions with their new acquaintance (e.g., "This seems like the kind of person whom I would like to get to know."; 1 = *Strongly disagree* to 7 = *Strongly agree*). These two scales were significantly correlated ($r = .63$, $p < .001$). Thus, we computed their average to index favorable impressions

[4] The confederate was instructed to respond naturally to all questions but six. These six questions were scripted to give the impression that the confederate was clumsy, frugal, and superstitious. In the snap judgment task, participants evaluated novel faces on these three traits and three filler traits (blunt, conservative, headstrong) in addition to evaluative traits discussed in the text. Neither WHR nor resemblance to the interaction partner nor the interaction between these variables influenced evaluations of unknown faces on the scripted (*p*s > .65) or the filler traits (*p*s > .36), except a significant positive relationship between WHR of unknown others and responses to filler traits ($\gamma_{20} = .062$, $SE = .019$, $p = .003$), likely due to the fact that the filler traits were slightly negatively valenced. For the purposes of the current paper, we focused only on judgments on the evaluative traits.

about the interaction partner (α = .91, M = 5.25, SD = .67). Impressions about the new acquaintance were above the midpoint of the scale ($t(36) = 11.36$, $p < .001$) regardless of which confederate participants interacted with (M=5.28, SD=.65 for Confederate 1 and M = 5.22, SD = .70 for Confederate 2, $t(35) = .28$).

In the second part of the study, participants were asked to complete a snap judgment task about unknown others. The snap judgment task was similar to Study 1. Participants evaluated 24 faces, either resembling Confederate 1 or Confederate 2 on 4 traits aimed to assess favorable impressions (trustworthy, supportive, warm, selfish)[5]. Each trial consisted of a fixation cross (1000 ms), a face (500 ms), and a question (e.g., Trustworthy?), which remained on the screen until participants indicated "yes" or "no" by pressing "D" or "K." Response keys ("yes" on left vs. right) were counterbalanced across participants. Responses to all four trait questions were averaged (after reverse scoring the trait selfish) to index snap judgments of liking for each novel face.

After completing the snap judgment task, participants' impressions of their new acquaintance were assessed on the same four traits (trustworthy, supportive, warm, selfish) using a 7-point scale (1 = *Not at all*, 7 = *Very*) to obtain another measure of liking of the acquaintance (α = .76, M = 5.65, SD = .80). Again, evaluations of the new acquaintance were above the midpoint of the scale ($t(36) = 12.50$, $p < .001$), regardless of which confederate participants interacted with (M = 5.85, SD = .85 for Confederate 1 and M = 5.48, SD = .73 for Confederate 2, $t(35) = 1.45$, $p = .16$).

[5] Since pilot testing showed that Confederate 1 had less distinctive facial features than Confederate 2, we morphed 60% of Confederate 1's face with 40% of each unknown face whereas we morphed 50% of Confederate 2's face with 50% of each unknown face. To test whether the morphing procedure created similar levels of resemblance between novel faces and each confederate, we looked at responses in the categorical judgment task. Specifically, to index participants' ability to discriminate faces resembling the interaction partner from those that did not, we computed an A′ score for each participant (Snodgrass & Corwin, 1988). Participants showed similar levels of discrimination when the interaction partner was Confederate 1 (A′ = .72) vs. Confederate 2 (A′ = .68, $t < 1$), revealing that the morphing procedure was successful in creating equal levels of similarity between the novel faces and each confederate's face.

Finally, to measure categorical judgments participants completed a discrimination task identical to the snap judgment task except that participants indicated whether each of 24 faces resembled their new acquaintance or not.

To create stimuli for the judgment tasks, we used morphing procedures similar to Study 1. We took photographs of confederates' faces straightly facing the camera with a neutral expression. We used the 24 faces compiled from databases in Study 1 to create 2 sets of male faces. We morphed Confederate 1's face with each of 12 faces in one set and Confederate 2's face with each of 12 faces in the remaining set[6]. Face sets were counterbalanced across participants. All morphs were converted to grayscale and equated for luminance using the SHINE toolbox (Willenbockel et al., 2010). Facial WHR of each stimulus face in the snap judgment task was calculated using the procedures in Study 1 (Cronbach's α = .85, r = .78).

Data analytic strategy. We used data analytic strategies similar to Study 1 to estimate the effects of facial *similarity to confederate* (1 = similar to Confederate 1, 0 = similar to Confederate 2) and WHR at the level of facial stimuli. The level-1 equation was

Level-1 model

Equation 2.0

$$(snap\ judgment)_{ij} = \beta_{0j} + \beta_{1j}(similarity\ to\ confederate) + \beta_{2j}(WHR) + r_{ij}$$

where β_{0j} represents participant j's mean judgment of an average-WHR face resembling Confederate 2, β_{1j} and β_{2j} represent, for each participant j, the effects of similarity to the confederate and WHR, respectively, and r_{ij} represents the residual error term.

[6] Confederate 1 had higher WHR (2.01) than Confederate 2 (1.71). Hence faces morphed with Confederate 1's face were on average higher in facial WHR (M = 2.00) than the faces morphed with Confederate 2's face (M = 1.88, $t(36) = 24.36$, $p < .001$). Results showed that perceivers on average evaluated faces morphed with the higher (vs. lower) WHR confederate less favorably (M = .37 and M = .62, respectively, $t(36) = 7.59$, $p < .001$). However, to capture natural variation in WHR of each of 24 faces in addition to the differences in WHR created using the morphing procedure, we used MLM in our analyses rather than averaging across faces morphed with each confederate. Such a strategy increases the confidence that the findings are due to differences in facial WHR rather than differences between the confederates other than their WHR.

The level-2 model estimated the average effects for the entire sample.

Level-2 model

Equation 2.1

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\textit{interaction partner}) + u_{0j}$$

Equation 2.2

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

Equation 2.3

$$\beta_{2j} = \gamma_{20}$$

where γ_{00} represents, for the entire sample, the mean judgment of an average-WHR face resembling Confederate 2 for participants who interacted with Confederate 2, γ_{10} and γ_{20} represent the average effect of similarity to confederate and WHR, respectively, γ_{01} represents the effect of interaction partner's identity (1 = Confederate 1, 0 = Confederate 2), and u_{0j} and u_{1j} represent the residual error terms.

To test whether similarity to the newly met acquaintance influenced judgment, the term $\gamma_{11}(\textit{interaction partner}_{ij})$ was added to Equation 2.2.

Equation 2.2.1

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\textit{interaction partner}) + u_{1j}$$

The coefficient γ_{11} represents the interaction term between interaction partner's identity (Confederate 1 vs. 2) and facial similarity of novel faces to the confederate (Confederate 1 vs. 2) and hence provides an estimate of affective generalization from the new acquaintance. That is, if this coefficient is significantly different from zero, this would indicate that similarity to the newly met acquaintance has an effect on judgment over and above which confederate participants interacted with and whether the target face resembles a given confederate.

Another MLM was performed to test whether the effect of WHR varied across levels of similarity to the newly met acquaintance. The level-1 equation was identical to Equation 2.0 except that it included the similarity to confederate × WHR interaction term:

$(snap\ judgment)_{ij} = \beta_{0j} + \beta_{1j}(similarity\ to\ confederate) + \beta_{2j}(WHR) + \beta_{3j}$(similarity to confederate × WHR) + r_{ij}

The level-2 model was as follows:

$\beta_{0j} = \gamma_{00} + \gamma_{01}(interaction\ partner) + u_{0j}$

$\beta_{1j} = \gamma_{10} + \gamma_{11}(interaction\ partner) + u_{1j}$

$\beta_{2j} = \gamma_{20} + \gamma_{21}(interaction\ partner)$

$\beta_{3j} = \gamma_{30} + \gamma_{31}(interaction\ partner) + u_{3j}$

In this model, the coefficient γ_{31} corresponds to the three-way interaction between WHR, similarity to confederate, and the interaction partner's identity, and hence provides an estimate of whether the effect of shared cue (WHR) varied depending on the levels of the idiosyncratic cue (similarity to the newly met acquaintance).

To assess performance in the categorization task, similar multilevel models were conducted with accuracy of responses and categorization latencies of correct responses as dependent variables. Trials with latencies outside the expected range (<150 ms or >4999 ms) were excluded (2.6% of all trials). Latencies less than 300 ms and greater than 3000 ms were recoded to 300 ms and 3000 ms, respectively. Analyses were conducted using log-transformed latencies. Analyses using untransformed latencies were highly similar to those reported here.

Accuracy of categorization was analyzed with similar MLMs except that the models were logistic given the binary outcome variable (correct response or not). Estimates from population-average analyses (also referred to as Generalized Estimating Equations; Zeger, Liang, & Albert, 1988) are reported.

Results and Discussion

Evaluative judgments. Replicating Study 1, participants judged novel faces less favorably as WHR increased (γ_{20} = -.069, *SE* = .014, $p < .001$, *standardized coefficient* = -.205).

To investigate whether affective generalization can occur from a newly met acquaintance, we looked at the interaction between similarity to confederate and the interaction partner. The coefficient of this interaction (i.e., γ_{11} in Equation 2.2.1) provides an estimate of affective generalization from the newly met acquaintance. For example, if participants whose interaction partner was Confederate 1 evaluate novel faces similar to Confederate 1 (vs. Confederate 2) or participants whose interaction partner was Confederate 2 evaluate novel faces similar to Confederate 2 (vs. Confederate 1) more favorably, this would provide evidence for affective generalization from the new acquaintance. In line with Study 1, there was no appreciable evidence that facial resemblance to the new acquaintance affected snap judgments. The interaction between the identity of the interaction partner and similarity to the confederate was not significant (γ_{11} = -.029, *SE* = .064, *p* = .651, *standardized coefficient* = -.036), failing to support the prediction that favorable impressions about a new acquaintance with whom one has just had an intimate face-to-face interaction would generalize to novel faces resembling this person.

Finally, there was no significant evidence that the effect of WHR varied depending on similarity to the newly met acquaintance (γ_{31} = -.044, *SE* = .055, *p* = .433, *standardized coefficient* = -.056)[7]. There was an unexpected effect of similarity to confederate (γ_{10} = -.149, *SE* = .035, *p* < .001, *standardized coefficient* = -.222) such that participants evaluated novel faces resembling Confederate 2 (vs. Confederate 1) more favorably. The specific confederate participants interacted with did not appreciably influence judgments (γ_{01} = .029, *SE* = .046, *p* = .534, *standardized coefficient* = .043).

Categorical judgments. Next, we looked at whether similarity to the newly met acquaintance and WHR interact to predict accuracy in the categorization task. Given the interaction between similarity to confederate and interaction partner represents the effect of

[7] Supplementary analyses were run to test whether post-interaction impressions or explicit trait judgments toward the confederate moderated the effect of WHR or similarity to the newly met acquaintance. No significant interaction effects emerged (all *p*s > .37).

similarity to the newly met acquaintance, the three-way interaction between interaction partner, similarity to confederate, and WHR would provide evidence that similarity to the new acquaintance and WHR yield interactive effects. Although none of the main effects were significant (*p*s > .162), results showed a significant interaction between similarity to confederate and interaction partner (odds ratio = .291, γ_{11} = -1.233, *SE* = .392, *p* = .003). Importantly, this effect was qualified by the predicted three-way interaction between interaction partner, similarity to confederate, and WHR (odds ratio = .336, γ_{31} = -1.092, *SE* = .340, *p* = .003), showing that the shared cue of WHR interacted with the idiosyncratic cue of resemblance to the acquaintance.

To probe this three-way interaction, we first collapsed the two-way interaction between similarity to confederate and interaction partner into a dummy variable that represents whether novel faces resemble the newly met acquaintance (1 = acquaintance-similar, 0 = acquaintance-dissimilar). For example, if the interaction partner was Confederate 1, a novel face similar to Confederate 1 was coded as acquaintance-similar whereas a novel face similar to Confederate 2 was coded as acquaintance-dissimilar. Then, we ran an MLM including the main effects of WHR and similarity to the new acquaintance as well as the interaction between the two.

When the novel faces were wider, participants were less likely to correctly categorize acquaintance-similar (vs. acquaintance-dissimilar) faces (odds ratio = .373, γ = -0.985, *SE* = .242, *p* < .001; see Figure 3.2). However, similarity to the new acquaintance did not appreciably influence categorization accuracy for narrower faces (γ = -.319, *SE* = .260, *p* = .227). The interaction between WHR and similarity to the new acquaintance was marginally significant (odds ratio = .717, γ= -.333, *SE* = .172, *p* = .061).

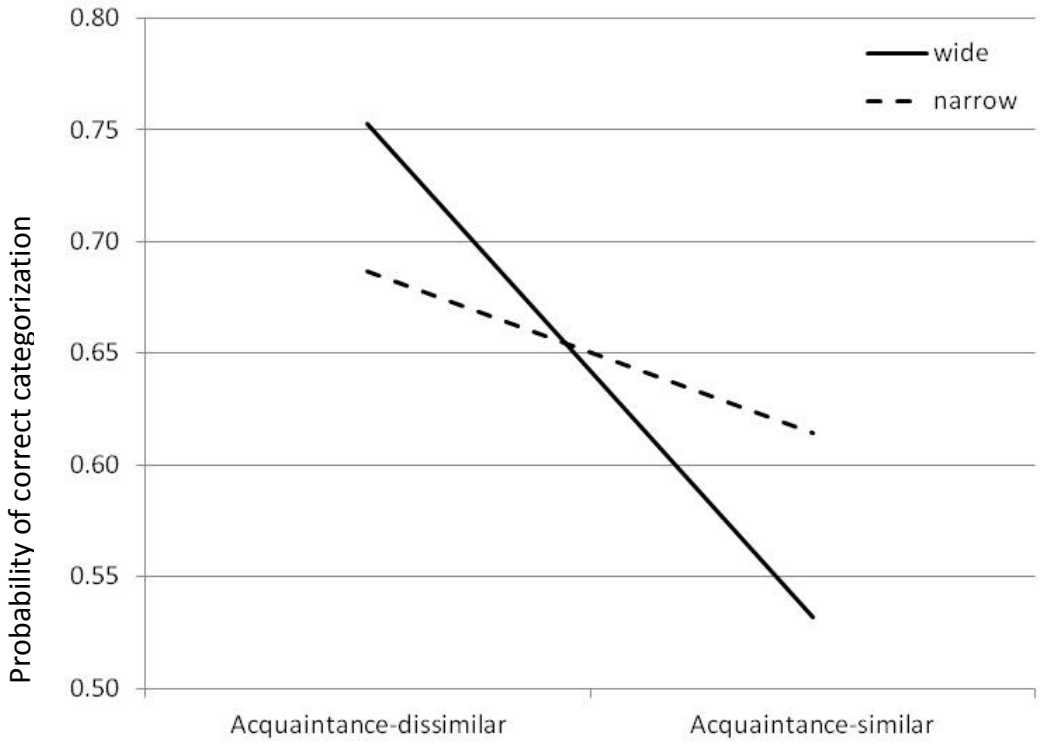

Figure 3.2. Probability of correctly categorizing novel faces as a function of facial WHR and resemblance to the newly met acquaintance in Study 2.

Analyses focusing on latencies of correctly categorized trials (65% of all trials) revealed no significant main effects (*p*s > .157). Although the predicted three-way interaction between interaction partner, similarity to confederate, and WHR did not reach conventional levels of significance (γ = .101, *SE* = .071, *p* = .164, *standardized coefficient* = .156) either, we probed this interaction using the procedures outlined above. When the novel faces were wider, participants were marginally slower to correctly categorize acquaintance-similar (vs. dissimilar) faces (γ = .115, *SE* = .063, *p* = .078, *standardized coefficient* = .209) whereas when the novel faces were narrower, they were marginally faster to categorize acquaintance-similar (vs. dissimilar) faces (γ = -.072, *SE* = .042, *p* = .095, *standardized coefficient* = -.131). The interaction between WHR and the dummy variable representing similarity to the new acquaintance was significant (γ = .062, *SE* = .030, *p* = .042, *standardized coefficient* = .159; see Figure 3.3).

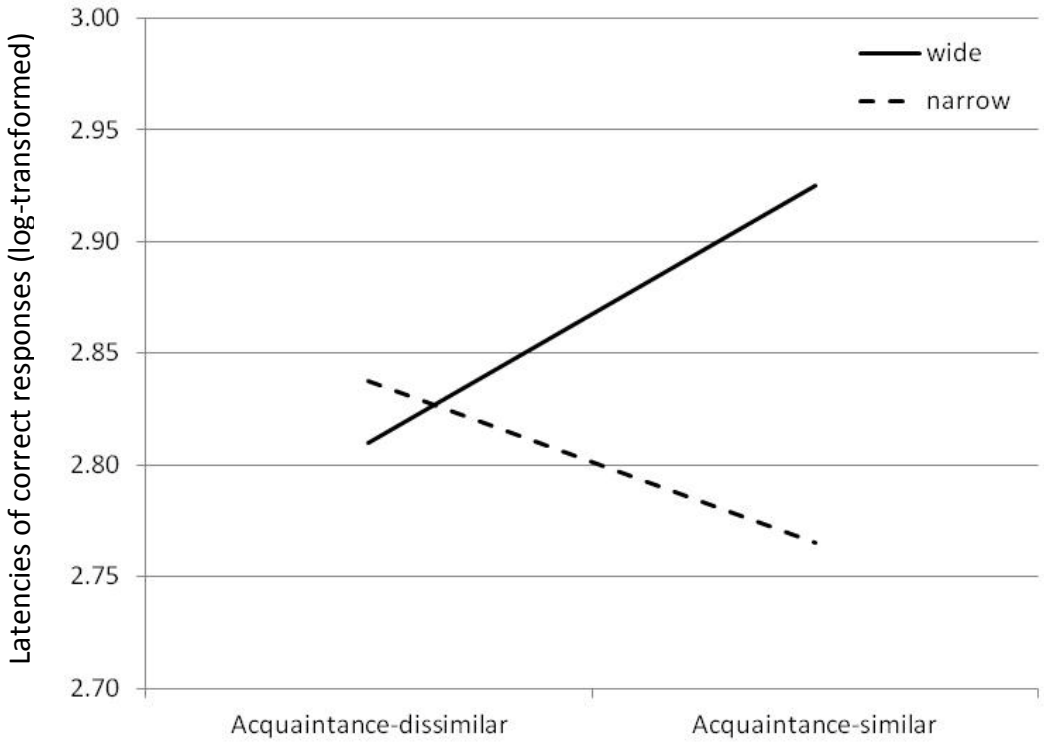

Figure 3.3. Latencies of correct responses in the categorization task in Study 2 as a function of facial WHR and resemblance to the newly met acquaintance.

To sum, replicating Study 1, men with wider (vs. narrower) faces were evaluated less favorably even when the faces were presented as quickly as 500 ms. However, again, we did not find significant evidence that positive associations about a newly met acquaintance led to affective generalization, even though the learning occurred through a highly personal and intensive face-to-face interaction. This finding is consistent with Study 1, which failed to show significant affective generalization from a "good person" associated with praiseworthy behaviors, although it is inconsistent with the findings in Chapter 2 (Günaydin et al., 2012).

The absence of affective generalization in the current study is interesting given the closeness-generating interaction provides a personally-relevant, ecologically valid way of forming positive associations about another person through mutual self-disclosures as in everyday life. Moreover, the face-to-face nature of the interaction enabled participants to view the acquaintance in motion for a prolonged duration (45 minutes), giving them ample

opportunities to form an abstract representation of the acquaintance's face from multiple viewpoints. Although resemblance to the new acquaintance did not appreciably influence evaluative judgments, performance in the categorization task provided evidence that participants formed a favorable representation of their new acquaintance. Specifically, participants responded slowly and less accurately when similarity to the acquaintance was simultaneously accompanied by a higher WHR, a cue indicative of untrustworthiness, suggesting that perceivers displayed implicit liking of the acquaintance in the categorization task.

Why did participants display evidence of liking the confederate in the categorization task but not in the snap judgment task? One possibility is that the idiosyncratic cue was less subtle in the former task compared with the latter. In the snap judgment task there was no reference to the idiosyncratic cue. Given the idiosyncratic cue pertains to a newly formed representation, it is less likely to be spontaneously activated to make sense of unknown others (e.g., Andersen & Chen, 2002; Andersen, Glassman, Chen, & Cole, 1995) in the absence of explicit instructions to attend to the cue. Therefore, when a subtle cue pertaining to a fledgling representation is encountered with multitude of other cues that might inform evaluative judgments (e.g., gender, ethnicity, facial WHR, babyish features, emotionally expressive features), it might not appreciably affect evaluative judgments. However, in the categorization task, participants were instructed to categorize faces on the basis of facial similarity to the acquaintance which amplified the salience of the idiosyncratic cue. When the idiosyncratic cue was salient, the positive representation of the new acquaintance might have been more strongly activated, which might have in turn led shared cues (e.g., facial WHR) congruent and incongruent with this representation to influence processing efficiency. Although speculative, this suggests that increasing the salience of the idiosyncratic cue in the snap judgment task or the accessibility of the newly formed representation might facilitate affective generalization from a newly met acquaintance.

Study 3

An example of a chronically accessible, positive representation that is naturally formed in day-to-day life is the representation of a significant other. Given such representations have

pervasive effects on how we make sense of unknown others (Andersen & Chen, 2002; Andersen et al., 1995; Tong & Nakayama, 1999), affective generalization should more readily occur when the idiosyncratic cue is resemblance to a significant other. Therefore, in Study 3 we examined how resemblance to one's romantic partner (an idiosyncratic cue) and facial WHR (a shared cue) simultaneously influence evaluative and categorical judgments. In line with Study 2, we expected these cues would have unique, additive effects on evaluative judgments (i.e., snap judgments of liking) whereas they would have interactive effects on categorical judgments (i.e., indicating whether or not unknown faces resemble one's romantic partner).

To test these predictions, we re-analyzed data from Günaydin et al. (2012) using MLM to estimate for each perceiver the role of facial WHR and resemblance to a romantic partner on evaluative and categorical judgments. Since WHR is a cue that predominantly influences evaluations of male faces (e.g., Stirrat & Perrett, 2010), the analyses focused on female perceivers who evaluated male targets. Moreover, reanalyzing this data set provided us with a unique opportunity to investigate whether being in a romantic relationship with a higher (vs. lower) WHR partner would diminish the effect of WHR on judgments of liking. Repeated favorable experiences with a high-WHR partner as well as the general tendency to associate partners with positivity (e.g., Zayas & Shoda, 2005) may over time reduce the strength of the association between high WHR and untrustworthiness. Therefore we predicted that in the snap judgment task WHR would be less strong cue of trustworthiness for individuals with high- (vs. low-) WHR partners.

Method

Participants. Thirty heterosexual women (*Mean* age=21 years, *SD*=2.96; relationship length=12-132 months) and their romantic partner participated in the study. One couple withdrew from the study, leaving 29 female participants.

Procedure and measures. In session 1, participants posed for a neutral headshot (hair pulled back, jewelry/glasses removed). To create stimuli, we created yoked pairs between female participants. Using morphing procedures similar to Study 2, we morphed the partner's

photograph with each of 12 of 24 male faces used in Studies 1 and 2 to create 12 "partner-similar" faces. Similarly, we morphed the yoked participant's partner's face with each of the remaining 12 faces to create 12 "yoked-similar" faces. Each yoked pair saw the same faces, hence controlling for any peculiarities in stimuli. The sets of faces used in morphing were counterbalanced across participants.

In session 2, which took place 2 to 4 weeks after session 1, participants completed a snap judgment task similar to Study 2. Specifically, they made snap judgments of each novel face (12 partner-similar, 12 yoked-similar) on six traits (trustworthy, supportive, accepting, attractive, intelligent, aggressive). A subset of participants (N = 18) also completed a categorization task similar to Study 2 in which they indicated whether each novel face resembled their romantic partner (see Günaydin et al., 2012 for complete methodological details).

Facial WHR of each novel face was calculated as in Study 1 except that a subset (20%) of the faces was measured by the second rater. Since inter-rater agreement was very high (Cronbach's α=.97, r = .93), the first rater's measurements were used in the analyses.

Data analytic strategy. The data analytic procedures to test the unique and interactive effects of WHR and similarity to romantic partner on evaluative and categorical judgments were similar to previous studies. The level-1 equation for assessing snap judgments of liking was

Level-1 model

Equation 3.0

$$(snap\ judgment)_{ij} = \beta_{0j} + \beta_{1j}(similarity) + \beta_{2j}(WHR) + r_{ij}$$

where β_{0j} represents participant j's mean judgment of an average-WHR face not resembling the partner, β_{1j} and β_{2j} represent, for each participant j, the effects of similarity to the romantic partner and WHR, respectively, and r_{ij} represents the residual error term.

The level-2 model estimated the average effects for the entire sample.

Level-2 model

Equation 3.1

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

Equation 3.2

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

Equation 3.3

$$\beta_{2j} = \gamma_{20}$$

where γ_{00} represents, for the entire sample, the mean judgment of an average-WHR face not resembling the partner, γ_{10} and γ_{20} represent the average effect of similarity and WHR, respectively, and u_{0j} and u_{1j} represent the residual error terms.

Next, similar MLMs were conducted to test whether the effect of WHR on snap judgments varied depending on similarity to the partner. The level-1 equations were the same as the previous model except that they also included the similarity × WHR interaction term as a predictor. The level-2 equations were also the same except that an additional equation was included to estimate whether for the entire sample the average effect of WHR varied across levels of similarity.

To assess performance in the categorization task, similar MLMs were conducted with categorization latencies of correct responses and accuracy as dependent variables. The outliers were handled using procedures reported in Study 2 (1.2% of all trials were excluded). Logistic MLMs were performed for analyzing accuracy given that the outcome is binary (correct response or not).

Finally, an MLM was conducted to test whether having a high-WHR partner decreases the negative association between WHR and snap judgments. For this analysis, the level-1 model estimated, for each participant, a regression line predicting participant's *snap judgment* of each yoked-similar face from WHR. Partner-similar faces were excluded from this analysis because morphing procedures used to create partner-similar faces makes the WHR of those faces similar to that of the partner. Thus, including partner-similar faces in this analysis would have made it

impossible to interpret whether any observed effects are due to the partner's WHR or the novel face's similarity to the partner. Therefore, only yoked-similar faces were used to test whether the WHR of the partner moderated the effect of target-WHR on snap judgments.

Level-1 model

Equation 4.0

$$(snap\ judgment)_{ij} = \beta_{0j} + \beta_{1j}(WHR) + r_{ij}$$

where β_{0j} represents participant *j*'s mean judgment of a target face, β_{1j} represents the effect of WHR (standardized), and r_{ij} represents the residual error term.

The level-2 model included the WHR of participant's romantic partner as a predictor.

Level-2 model

Equation 4.1

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(partner\text{-}WHR) + u_{0j}$$

Equation 4.2

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(partner\text{-}WHR)$$

In this analysis, the estimate of interest was γ_{11} as it represents the effect of partner-WHR on the slope predicting snap judgments from target-WHR.

Results and Discussion

Evaluative judgments. Replicating previous studies, higher WHR was negatively associated with positivity toward novel faces (γ_{20} = -.059, *SE* = .013, $p < .001$, *standardized coefficient* = -.201). Facial similarity to one's romantic partner also influenced snap judgments, with partner-similar faces being judged more positively (γ_{10} = .173, *SE* = .047, $p = .001$, *standardized coefficient* = .294). There was no appreciable evidence that the effect of WHR varied across levels of similarity (γ_{30} = -.014, *SE* = .019, $p = .472$, *standardized coefficient* = -.034). In other words, when novel men resembled a romantic partner, both facial resemblance and WHR independently influenced judgments of liking.

Interestingly, the relationship between WHR and liking was significantly attenuated for women with wide-faced partners (γ = -.032, *SE* = .018, *p* = .093, *standardized coefficient* = -.117) whereas women with narrow-faced partners showed a strong negative association between WHR and judgments of liking (γ = -.084, *SE* = .026, *p* = .003, *standardized coefficient* = -.306). The interaction between partner's WHR and target face's WHR was marginally significant (γ_{11} = .026, *SE* = .015, *p* = .085, *standardized coefficient* = .089; see Figure 3.4)[8]. This provides evidence that favorable experiences with a significant other can weaken the relationship between facial WHR and evaluation, suggesting that this relationship might have developed by observing a covariation between WHR and untrustworthiness in men over time (Stirrat & Perrett, 2010).

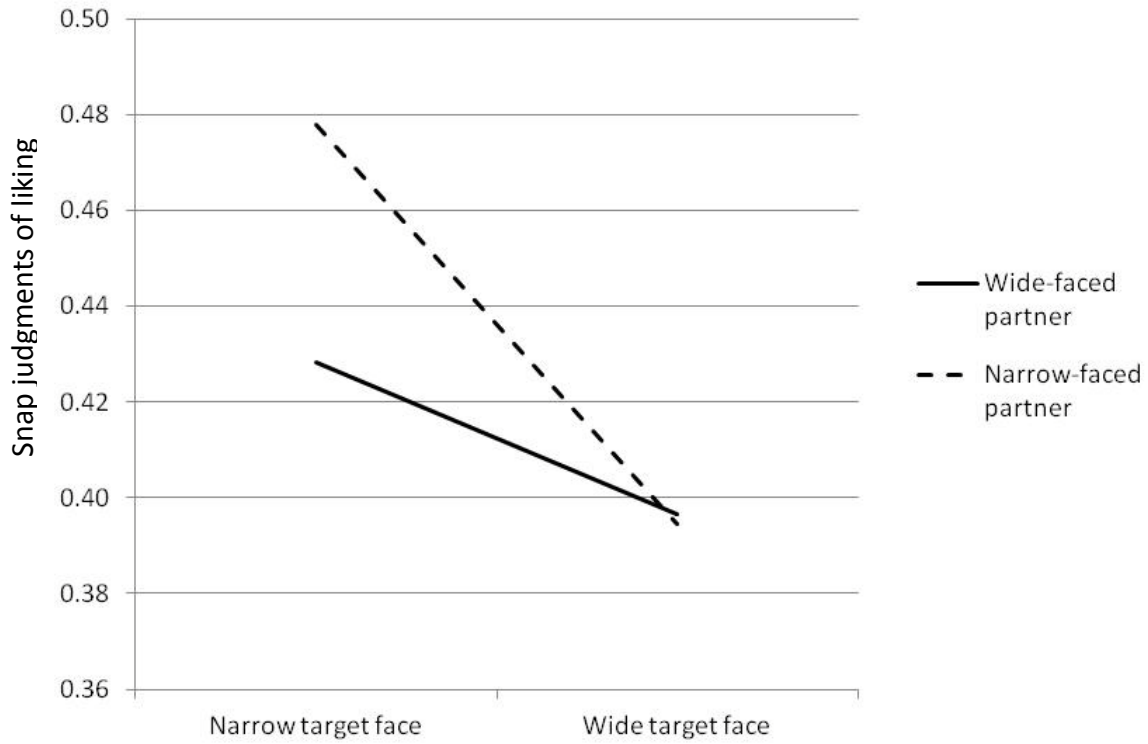

Figure 3.4. The association between novel faces' WHR and judgments of liking as a function of romantic partner's WHR.

[8] Results were highly similar when the analysis was conducted in the complete dataset including both partner-similar and yoked-similar faces (γ_{11} = .028, *SE* = .017, *p* = .085).

Categorical judgments. Next, we looked at performance in the categorization task for evidence that facial WHR and similarity to partner would interact to influence processing efficiency when participants are asked to make categorical judgments. Indeed, when the novel faces were wider, participants were less likely to correctly categorize partner-similar (vs. yoked-similar) faces (odds ratio = .224, γ = -1.498, *SE* = .369, *p* = .009; see Figure 3.5), suggesting that cues signaling untrustworthiness (wider faces) can interfere with processing of resemblance of novel faces to partner. However, similarity to the partner did not appreciably influence categorization accuracy for narrower faces (odds ratio = .584, γ = -.537, *SE* = .355, *p* = .148). The interaction between similarity to partner and WHR was significant (odds ratio = .619, γ_{30} = -.480, *SE* = .224, *p* = .046), along with a significant effect of similarity to the romantic partner (odds ratio = .361, γ_{10} = -1.018, *SE* = .308, *p* = .006), but no significant effect of WHR (odds ratio = 1.116, γ_{20} = .110, *SE* = .144, *p* = .448).

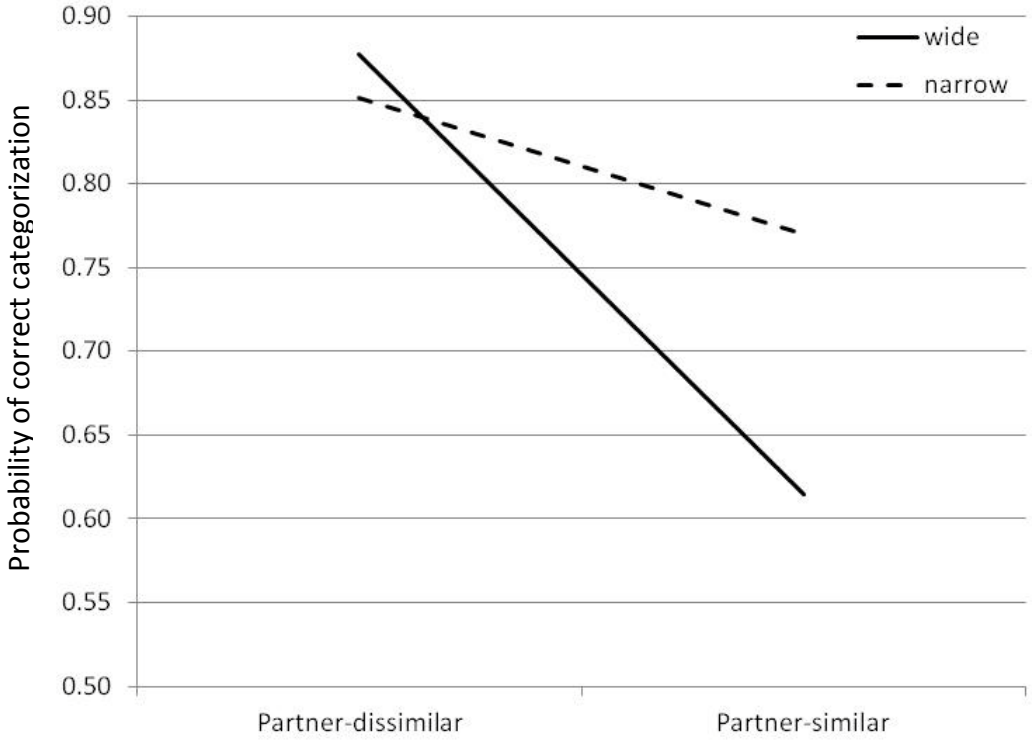

Figure 3.5. Probability of correctly categorizing novel faces as a function of facial WHR and resemblance to the romantic partner in Study 3.

Analyses focusing on latencies of correctly categorized trials (80% of all trials) revealed a similar pattern. Participants were much slower in correctly categorizing partner-similar (vs. yoked-similar) faces when the novel faces were wider (γ = .145, *SE* = .038, *p* = .001, *standardized coefficient* = .307; see Figure 3.6). However, similarity to the partner did not appreciably influence responses to narrower faces (γ = .004, *SE* = .043, *p* = .926, *standardized coefficient* = .008). The interaction between WHR and similarity to the partner was significant (γ_{30} = .070, *SE* = .021, *p* = .004, *standardized coefficient* = .210).The negative relationship between WHR and response latencies approached marginal significance (γ_{20} = -.017, *SE* = .010, *p* = .109, *standardized coefficient* = -.072) and the effect of similarity to the romantic partner was significant (γ_{10} = .065, *SE* = .035, *p* = .080, *standardized coefficient* = .138) such that participants responded faster to partner-similar (vs. yoked-similar) faces.

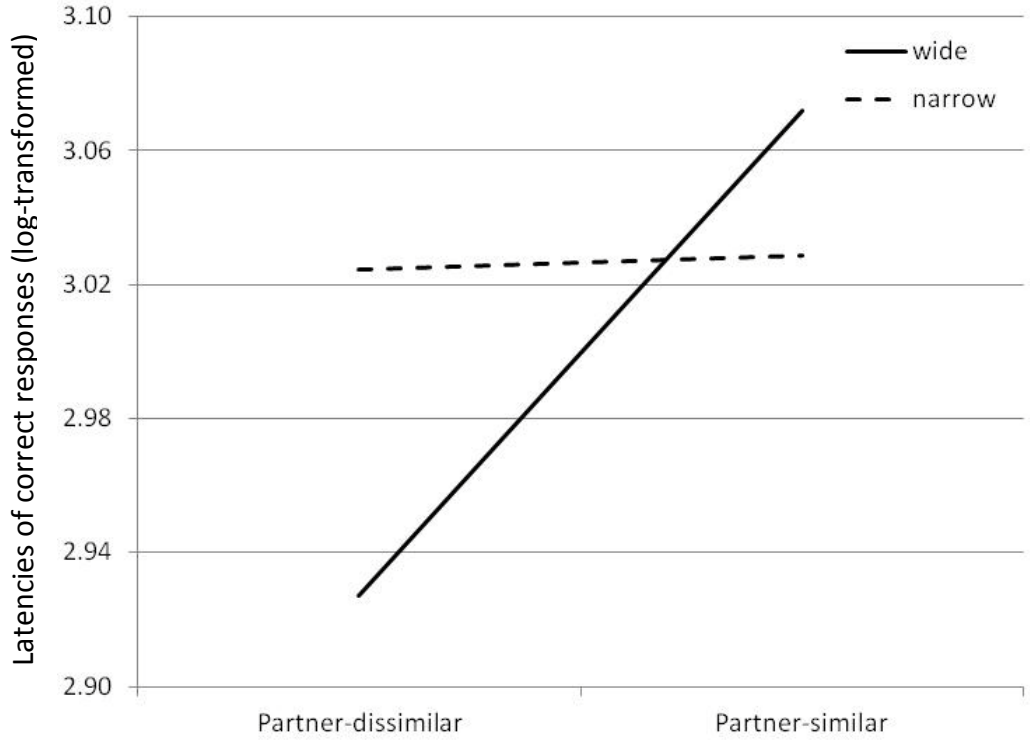

Figure 3.6. Latencies of correct responses in the categorization task in Study 3 as a function of facial WHR and resemblance to the romantic partner.

General Discussion

Multitude of facial cues is simultaneously present when perceivers try to make sense of others in everyday life. By assessing judgments of twenty-four novel faces in a within-participants design and using multilevel modeling to estimate for each perceiver the effects of facial resemblance and WHR at the level of facial stimuli, the present research is the first to investigate the simultaneous role of idiosyncratic and shared cues on person perception. To shed light on when the simultaneous presence of these multiple facial cues leads to additive or interactive effects, we made a distinction between categorical (i.e., indicating whether or not unknown faces are similar to one's romantic partner or an acquaintance) and evaluative judgments (i.e., indicating whether unknown others are good or bad).

Study 1 focused on evaluative judgments and showed that resemblance to newly encountered individuals and facial WHR had unique, additive effects on snap judgments of liking. Specifically, men with wider (vs. narrower) faces were evaluated less favorably even when the faces were presented for only 500 ms. We also found evidence that compared to a neutral baseline, unknown faces resembling a "bad person" described to engage in blameworthy behaviors were evaluated less favorably. Importantly, affective generalization from a "bad person" occurred only when the orientation of faces at learning was the same as the orientation of faces at evaluation, providing the first evidence that the match in stimulus conditions between learning and evaluation is a key factor influencing affective generalization. Interestingly, resemblance to a "good person" described to engage in praiseworthy behaviors did not appreciably influence judgments of liking. These results are consistent with past work (Verosky & Todorov, 2010; 2013) showing that affective generalization from a "bad person" is more pronounced than affective generalization from a "good person." However, research described in Chapter 2 (Günaydin et al., 2012) provided evidence that resemblance to a positively-valenced significant other (i.e., one's romantic partner) can lead to affective generalization. How can these findings be reconciled? One possibility is that personal significance of the known other might influence whether affective generalization can occur.

A more personally significant, intensive, and ecologically valid way of creating positive associations about a newly encountered person might be a face-to-face interaction. Therefore, Study 2 asked participants to engage in a 45-minute closeness-generating interaction with a new acquaintance. This study assessed both evaluative (i.e., trustworthy or not?) and categorical judgments (i.e., similar to acquaintance or not?) to investigate whether facial WHR and resemblance to the newly met acquaintance have additive or interactive effects depends on the type of judgment made. Results of the snap judgment task assessing evaluative judgments replicated the negative association between facial WHR and snap judgments of liking observed in Study 1. However, resemblance to the newly met acquaintance did not appreciably influence judgments of liking, suggesting that even a 45-minute closeness-generating interaction does not appreciably facilitate affective generalization from newly encountered individuals.

Results of the categorization task in Study 2 showed that facial resemblance to the acquaintance and WHR interacted to influence processing efficiency. Specifically, participants were less accurate and somewhat slower in categorizing acquaintance-similar (vs. dissimilar) faces when the unknown faces were wider. Given facial WHR is a cue signaling untrustworthiness, the fact that it interferes with the processing of acquaintance-similar faces suggests that participants formed a positive representation of the acquaintance. If participants indeed represent the new acquaintance positively, as implied by performance in the categorization task, why don't they generalize this positivity to unknown others resembling this person in the snap judgment task? The subtlety of the idiosyncratic cue in each task might account for this discrepancy. Unlike the categorization task in which participants are instructed to categorize faces on the basis of resemblance to the new acquaintance, participants received no instructions to process the resemblance in the snap judgment task. Therefore, the idiosyncratic cue was likely far less salient when participants made evaluative judgments, which might have resulted in no appreciable effect of this cue on liking.

Study 3 reanalyzed data presented in Chapter 2 to investigate how facial resemblance to romantic partners (an idiosyncratic cue) and WHR (a shared cue) simultaneously influence

categorical and evaluative judgments. Results showed an additive effect of these cues when participants were asked to make evaluative judgments in the snap judgment task. The negative relationship between facial WHR and liking found in previous studies was replicated. Moreover, women evaluated unknown men resembling their romantic partner (vs. a yoked participant's partner) more favorably. Although we did not find a significant interaction between shared and idiosyncratic cues to predict evaluative judgments, these cues interacted to predict processing efficiency when participants made categorical judgments. Similar to the results of Study 2, participants were less accurate and slower in categorizing partner-similar (vs. yoked-similar) faces when the unknown faces were wider. These findings suggest that resemblance to a liked known other—an idiosyncratic cue signaling trustworthiness—might be processed less efficiently in the context of a greater WHR—a shared cue signaling untrustworthiness.

Multiple Cues in Person Perception: Categorical versus Evaluative Judgments

The present studies provide the first systematic examination of whether type of judgment made (categorical vs. evaluative) influence the effect of multiple facial cues. Our results indicated that shared and idiosyncratic cues signaling trustworthiness have unique, additive effects on evaluative judgments whereas these cues have interactive effects on categorical judgments.

Why do the effects of shared and idiosyncratic cues depend on the type of judgment made? When perceivers are asked to make evaluative judgments (e.g., good vs. bad), perceivers are likely to use the infinite number of cues—the person's gender, ethnicity, facial WHR, babyfacedness, similarity to known others, to name just a few—available to them to evaluate the person. Research by Halford, Baker, McCredden, and Bain (2005) suggests that perceivers cannot accurately process interactions between more than four variables. Given such limitations on cognitive capacity, when the task at hand involves processing of a large number of cues—as in the case of evaluative judgment tasks—perceivers might process cues in an additive fashion rather than taking into account the complex interactions between a large number of cues. In contrast, when participants are asked to make categorical judgments (e.g., partner-similar or

dissimilar), the very nature of the task increases the salience of a particular focal cue (e.g., similarity to partner)—making it the basis of perceivers' judgments (e.g., Taylor & Fiske, 1978). Limiting attention to only one cue will likely reduce the relative complexity of the judgment task at hand and free cognitive resources to process whether cues are congruent or incongruent with the focal cue. Hence, when perceivers are asked to make categorical judgments, the presence or absence of cues conflicting with the focal cue might influence processing efficiency, producing interactive effects.

Although speculative, it is also possible that when categorizing faces similar to a liked known other, activation of amygdala—a region implicated in assessments of others' trustworthiness (e.g., Engell, Haxby, & Todorov, 2007; Winston, Strange, O'Doherty, & Dolan, 2002)—in response to wider (vs. narrower) faces is interfering with activation in fusiform face area—a region implicated in categorization of faces (e.g., Freeman, Rule, Adams, & Ambady, 2010; Platek & Kemp, 2009) and is shown to be modulated by activity in amygdala (e.g., Vuilleumier, Richardson, Armony, Driver, & Dolan, 2004). Future work should investigate this possibility.

The present work by showing that the effect of multiple facial cues might depend on the type of judgment might facilitate cross-fertilization of separate lines of work showing additive or interactive effects. Cues so far shown to have interactive effects (e.g., gaze direction and emotional expressions, Adams & Kleck, 2003) might produce additive effects when perceivers are asked to make evaluative judgments. Similarly, cues shown to predominantly have additive effects (e.g., multiple cues indicating ingroup status, Crisp & Hewstone, 2007) might lead to interactive effects when perceivers are asked to make categorical judgments.

The Role of Idiosyncratic Experiences on Shared Cues

The present research addressed an important question that was left unanswered by past work—whether the negative effect of WHR on snap judgments of liking depends on the *idiosyncratic experiences* of the perceiver. Study 3 showed that having a significant other with a greater WHR can alter how this cue influences evaluations of unknown others. Specifically, the

negative association between WHR and positive judgments was dampened for women with a high-WHR partner as compared to their counterparts with a low-WHR partner. This shows that idiosyncratic experiences can alter the extent to which cues that are shared across perceivers influence judgment. The susceptibility of WHR to effects of idiosyncratic experiences implies that the association between facial WHR and trustworthiness might be a product of personal experiences with wide- and narrow-faced men (Stirrat & Perrett, 2010).

These findings also raise the possibility that representations of other cues assumed to be widely shared across perceivers—such as babyish or emotionally expressive features—(e.g., Zebrowitz & Montepare, 2008) can be altered by idiosyncratic experiences. For example, past research showed that neutral faces bearing a slight resemblance to disgust and fear expressions are evaluated less favorably than those bearing a resemblance to happy expressions (e.g., Said et al., 2009). Would the negative relationship between facial resemblance to disgust expressions and liking be attenuated if a perceiver has a romantic partner who frequently expresses disgust? Similarly, would babyish features no longer be a strong cue of trustworthiness (e.g., Zebrowitz, Fellous, Mignault, & Andreoletti, 2003) if a perceiver has a mature-faced partner? Future work should explore these and similar questions.

By investigating the simultaneous role of facial resemblance to known others and WHR on person perception, the present research is the first to bridge distinct lines of research focusing on shared and idiosyncratic facial cues. Moreover, focusing on *both* evaluative and categorical judgments, the present work reconciles seemingly disparate research reporting additive versus interactive effects of multiple cues and opens exciting avenues for future work.

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CHAPTER 4

FIRST IMPRESSIONS BASED ON PHOTOGRAPHS PREDICT EVALUATIONS FOLLOWING LIVE INTERACTIONS

Research asking individuals to provide their impression of others based on still photographs revealed that we glean a great deal of information from a target person's facial appearance (e.g., Willis & Todorov, 2006). However, does facial appearance play a role in first impressions even when we interact with a person face-to-face? One way to answer this question is to compare judgments from static faces to those following live interactions. Since facial appearance is available to perceivers in both settings, consistency in judgments would provide evidence that perceivers tend to "judge a book by its cover." Although considerable research has focused on impressions based on face-to-face interactions (e.g., Chapdelaine, Kenny, & LaFontana, 1994; Finkel & Eastwick, 2008; Letzring, Wells, & Funder, 2006), this work has remained relatively separate from research investigating judgments based on a person's photograph (e.g., Günaydin, Zayas, Selcuk, & Hazan, 2012; Willis & Todorov, 2006). Present work aims to bridge this gap by investigating whether our impressions from photographs of faces relate to impressions following actual interactions.

On the one hand, research shows that a face-to-face interaction provides more information about another person than a static face does. Cues afforded by a live interaction—such as nonverbal behaviors including body posture, head nodding, gaze direction, and nonconscious mimickry (e.g., Chartrand & Bargh, 1999; Tickle-Degnen & Rosenthal, 1990), tone of voice (e.g., Berry, 1992), content of speech (e.g., Ireland, Slatcher, Eastwick, Scissors, Finkel, & Pennebaker, 2011), and choice of clothing (e.g., Mills & Aronson, 1965)—have been shown to influence judgments of liking. Thus, it is possible that these additional cues might drown out the effect of facial appearance on judgments during live interactions, which would result in little or no association between impressions from photographs and those following face-to-face interactions.

On the other hand, there is evidence showing that physical appearance plays an important role in how individuals evaluate and treat others (e.g., Günaydin et al., 2012; Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000; Olivola & Todorov, 2010). For example, a meta-analysis conducted by Langlois and colleagues showed that attractive individuals are evaluated and treated more favorably across cultures than their unattractive counterparts. Moreover, research by Olivola and Todorov (2010) found that when perceivers catch a glimpse of a person's physical appearance (vs. not), they rely less on diagnostic information (e.g., the base rate of drinking in the population) to predict the person's characteristics (e.g., whether s/he drinks or not). This suggests that physical appearance dramatically influences the extent to which perceivers incorporate additional information about a person in their first impressions. Given that judgments of liking can be made very quickly based on a very brief exposure to a person's face (Willis & Todorov, 2006), it is possible that perceivers might interpret the additional information they are getting from a live interaction to fit rapid judgments based on facial appearance (e.g., Darley & Gross; 1983; Gilbert & Osborne, 1989) or shape the interaction in ways that confirm their snap judgment based on facial appearance (e.g., Denrell, 2005; Snyder, Tanke, & Berscheid, 1977). This work suggests that the facial appearance of a person may color all the additional information provided by an actual interaction. So one might expect a strong association between judgments based on static images and those following an interaction.

To date, no work has compared judgments of liking from photographs and those following live interactions. The handful of studies that compared judgments based on photographs to those based on short video clips focused exclusively on judgments of attractiveness. These studies produced mixed findings, with some studies reporting significant and sizeable positive correlations and some reporting weak and nonsignificant correlations between judgments of attractiveness based on static faces and those based on videos (Lander, 2008; Penton-Voak & Chang, 2008; Rhodes, Lie, Thevaraja, Taylor, Iredell, Curran et al., 2011; Roberts, Saxton, Murray, Burriss, Rowland, & Little, 2009; Rubenstein, 2005). In addition to

focusing solely on attractiveness judgments, these studies mostly employed between-participants designs (but see Roberts et al., 2009), in which participants evaluating the photographs were different than those evaluating the videos. Such designs can only capture evaluative standards shared across perceivers but fail to tap into idiosyncratic factors (e.g., an unknown other's facial resemblance to one's romantic partner) that might lead perceivers to evaluate others similarly based on photographs and live interactions (e.g., Günaydin et al, 2012; Hönekopp, 2006).

The present studies employed a within-participants design in which each perceiver evaluated the target person (i.e., a confederate) both based on a photograph and a subsequent live interaction to investigate whether judgments of liking from photographs predict those following live interactions ("static-live association"). In Study 1, we investigated this question using a structured interaction (i.e., trivia game), which past work showed gives participants very little opportunity to get to know another person (Letzring et al., 2006). In Study 2, we tested whether the static-live association will hold even when impressions from photographs were obtained at least one month prior to the actual interaction. Moreover, this study employed both structured and unstructured interactions to investigate whether the static-live association will be observed for an unstructured interaction in which interaction partners can obtain more information about one another.

Study 1

Method

Participants. Forty-nine undergraduate students participated in the study. One participant was excluded from the analyses because he already knew the confederate, leaving 48 participants (*Mean* age=20.44 years, *SD*=2.57; 37 females)[9].

[9] Participants were preselected such that 23 indicated that their interaction partner resembled a significant other and 25 indicated that she did not resemble a significant other. Resemblance to the significant other did not influence impressions from the photograph or those following the live interaction (*t*s<1), and did not moderate the relationship between these two variables (t = 1.06, p = .30) so it will not be discussed further.

Procedure and measures. Participants came to the lab to interact with one of 14 female confederates, who they were told was another participant. Participants were first shown a color photograph of the confederate (smiling in front of a neutral background, see Figure 4.1 for an example) and were asked to provide impressions of her based on the photograph. They completed eight items assessing liking of the confederate (e.g., "In general, how positive is your impression of this person?"; 1 = *Not at all* to 7 = *Very*, α = .82) and nine items assessing willingness to engage in future interactions with the confederate (e.g., "This seems like the kind of person whom I would like to get to know."; 1 = *Strongly disagree* to 7 = *Strongly agree*, α = .92)[10]. Since these two scales were significantly correlated (r = .55, p < .001), they were averaged to index favorable impressions about the confederate (α = .91, M = 5.07, SD = .67)[11].

Figure 4.1. Examples of confederate photographs used in Studies 1 and 2. Participants provided first impressions of the confederate based on a smiling photograph in Study 1 and both smiling and neutral photographs in Study 2.

Then, participants engaged in a 10-minute interaction with the confederate. Prior to the interaction, the experimenter checked the confederate's physical appearance to make sure that

[10] Participants also rated their interaction partner on forty adjectives that are not relevant to the purpose of the current study and will not be discussed further.
[11] The results using each subscale were highly similar to those reported here.

her makeup and hair were identical to those in her photograph. Confederates were instructed to respond naturally to the participant during the interaction.

The interaction involved playing a trivia game, which consisted of ten questions of low, moderate, and high difficulty taken from Nelson and Narens (1980). The participant and the confederate were instructed to work together to come up with an answer to each question and even if they do not know the answer, to continue brainstorming about each question until their time is up. At the end of the interaction, the confederate left the room and participants completed the same items as before to provide impressions of her based on the interaction (α = .96, M = 5.27, SD = .88). At the end of the session, participants completed some self-report and demographic measures, and were fully debriefed.

Data Analytic Strategy

Because data points for each participant were nested within confederates and impressions of the confederate were obtained at two time points (i.e., after viewing the photograph and following the live interaction), we used linear mixed models (LMMs) to account for interdependency among data points. An LMM was performed with liking following the trivia game interaction as the dependent variable and liking based on the photograph as a fixed predictor. We also tested for random effects using procedures recommended by Hayes (2006) but found no significant evidence that the intercept and the slope of the predictor varied across confederates ($\chi^2(1) = 1.09$, $p = .30$ and $\chi^2(1) = 3.33$ $p = .07$, respectively)[12].

Estimation of Standardized Coefficients

To give the reader a sense of the effect sizes, standardized coefficients were computed using the following formula (Snijders & Bosker, 1999).

standardized coefficient = [S.D.(X) / S.D.(Y)] * B

where S.D.(X) and S.D.(Y) refer to the standard deviations of the predictor and the dependent variable, respectively, and B is the effect of the predictor estimated by the LMM. Standardized

[12] When the model allowed the slope of the predictor to vary across confederates, the results were highly similar to those reported here.

coefficients can be interpreted similar to the beta coefficients estimated in linear regression—as the increase in the dependent variable (in standard deviations) produced by each additional standard deviation increase in the predictor.

Results and Discussion

There was a strong positive relationship between liking from the photograph and liking following the live interaction (B = .745, SE = .159, $t(46) = 4.693$, $p < 0.001$, *standardized coefficient* = .569, see Figure 4.2). In other words, participants who had favorable impressions of their interaction partner from the photograph also tended to like her after the interaction. This suggests that facial appearance continues to inform impressions even after obtaining richer information about a person via an actual interaction. A major strength of Study 1 is employing a large number of target individuals (i.e., confederates), making it unlikely that the static-live association is due to characteristics of target individuals and hence increasing the generalizability of current findings.

The trivia game interaction we used in Study 1 provided little opportunity to participants to get to know their interaction partner. This leaves open the question of whether the static-live association would hold following an unstructured interaction which encourages participants to get to know their interaction partner better. Hence, we investigated in Study 2 whether impressions from photographs predict impressions following both structured and unstructured interactions. In addition, initial impressions based on the photograph were obtained at least one month before the actual interaction to prevent participants from forming conscious expectations about the interaction.

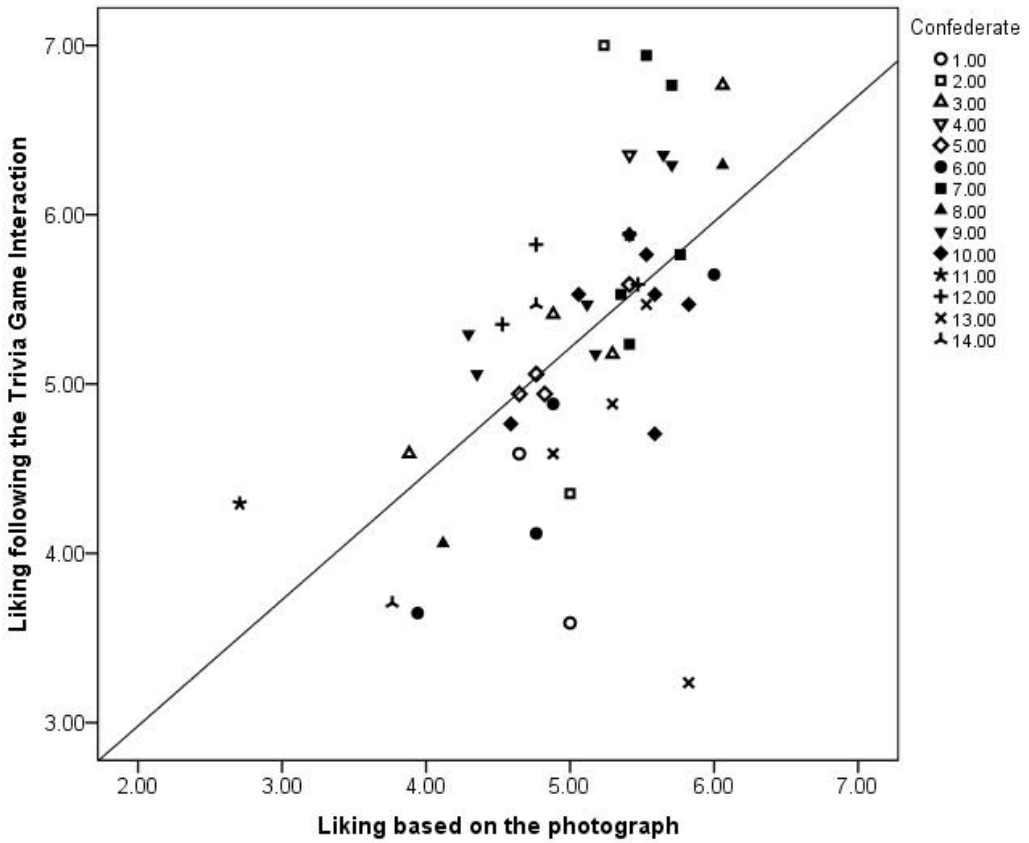

Figure 4.2. The association between judgments based on the photograph and those following the trivia game interaction in Study 1.

Study 2

Method

Participants. Fifty-six undergraduate students participated in the study. One participant was excluded from the analyses because she already knew the confederate, leaving 55 participants (*Mean* age=20.15 years, *SD*=2.02; 37 females).

Procedure and measures. Participants were asked to fill out an online prescreening survey in which they provided first impressions of each of four confederates based on a neutral and a smiling color photograph taken in front of a neutral background (see Figure 4.1 for examples). The order in which participants rated the confederates and the order in which smiling and neutral photographs were presented were counterbalanced across participants. Participants were asked to evaluate each photograph on four traits used in past work (Willis & Todorov,

2006; trustworthy, likeable, competent, aggressive; 1 = *Not at all* to 7 = *Extremely*) and four items assessing willingness to engage in future interactions with the person (e.g., "This seems like the kind of person whom I would like to get to know."; 1 = *Strongly disagree* to 7 = *Strongly agree*). These eight items were averaged to index favorable impressions about the confederate (α = .91, M = 4.42, SD = 1.13 for the neutral and α = .93, M = 4.80, SD = 1.15 for the smiling photograph). Participants also rated the photographs on attractiveness (1 = *Not at all* to 7 = *Extremely*). To get reliable measures of liking and attractiveness based on photographs, we averaged across ratings of neutral and smiling photographs of each confederate (α = .95, M = 4.61, SD = 1.11 for liking and α = .91, M = 3.98, SD = 1.56 for attractiveness).

Participants came to the lab at least one month (range = 35-212 days[13]) after completing the prescreening survey and were asked to interact with one of the four confederates. We preselected participants from the responders in the online survey such that they either had a very favorable (M = 5.60, SD = .24) or an unfavorable (M = 3.50, SD = .44, $t(53) = 22.14$, $p < .001$) initial impression of their interaction partner based on the photograph. Participants first played a trivia game with the confederate for 10 minutes similar to Study 1 and at the end of the game reported impressions of the confederate (α = .89) using the same questions as in the photograph evaluation. Then, they completed another 10-minute interaction in which they were instructed to try to get to know the other person as much as they can ("getting to know interaction"). At the end of this interaction, participants again provided impressions of the confederate (α = .89). Similar to Study 1, the confederate responded naturally to the participant during the lab session and her physical appearance (i.e., makeup, hair) was identical to that in the photographs.

Participants were fully debriefed at the end of the session. As part of the debriefing protocol, we asked participants to indicate anything they found strange or unusual about the study, guess the study hypotheses, and report whether they were suspicious at any point in the experiment that their interaction partner might be a confederate. Four participants reported

[13] The time lag between rating the photograph and the lab session did not moderate the static-live relationship ($t < 1$).

having seen the photograph of the confederate in the online survey and two reported that the confederate looked familiar.

Data Analytic Strategy

An LMM was performed with liking following the live interaction as the dependent variable, type of interaction (trivia game vs. getting to know interaction) and liking based on the photograph as fixed predictors. Neither the intercept nor the slope of liking based on the photograph varied across confederates ($\chi^2(1) = 1.10$, $p = .29$ and $\chi^2(1) = 1.15$, $p = .21$, respectively). We investigated whether the static-live association can be accounted by factors such as attractiveness or general likeability of the confederate by adding each of these factors to the above model in separate LMMs. The standardized coefficients were computed as described in Study 1.

Results and Discussion

The LMM analysis showed that replicating Study 1, there was a strong positive relationship between liking from the photograph and liking following the interaction ($B = .489$, $SE = .062$, $t(107) = 7.829$, $p < 0.001$, *standardized coefficient* = .595, see Figure 4.3). Importantly, the static-live association held excluding the 6 participants who remembered seeing the confederate in the online survey or who reported that the confederate looked familiar ($B = .498$, $SE = .066$, $t(95) = 7.546$, $p < 0.001$, *standardized coefficient* = .602). These findings show that impressions from photographs predict impressions following live interactions even when perceivers have no recollection of seeing the other person's photograph and hence cannot form conscious expectation about the live interaction.

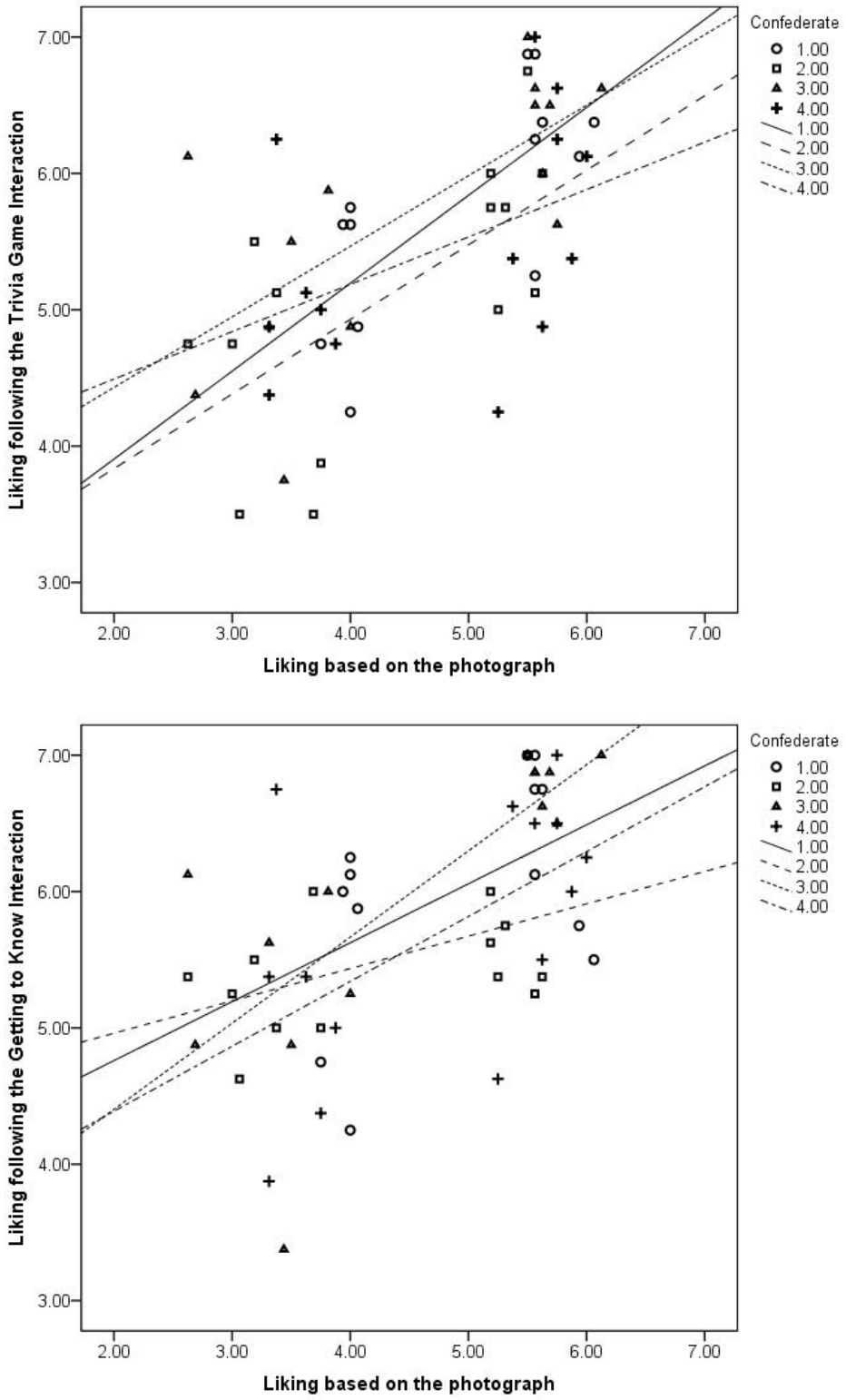

Figure 4.3. The association between judgments based on photographs and those following the trivia game and getting to know interactions in Study 2.

Consistent with past work showing that self-disclosure promotes rapport (Aron, Melinat, Aron, Vallone, & Bator, 1997), participants reported greater liking following the getting to know interaction (M = 5.798, SE = .097) compared to the trivia game (M = 5.507, SE = .097, $t(107)$ = 2.110, p = 0.037, *standardized coefficient* = .161). However, the static-live association did not vary by the type of interaction (B = -.055, SE = .125, $t(106)$ = -.439, p = 0.662, *standardized coefficient* = -.047), suggesting that facial appearance plays a role in first impressions even after getting to know the other person better.

Is the static-live association driven by dispositional differences that participants might have in liking of others? It is possible that some participants have a general tendency to like or dislike others. If the static-live association is primarily driven by such dispositional differences, then it should become insignificant controlling for impressions about the other three confederates' photographs. Although liking of the other confederates based on their photographs was significantly related to liking following the live interaction with a different interaction partner (B = .399, SE = .143, $t(106)$ = 2.792, p = 0.006, *standardized coefficient* = .243), controlling for this variable the static-live association held (B = .383, SE = .071, $t(106)$ = 5.364, $p < 0.001$, *standardized coefficient* = .466). This suggests that consistency in initial judgments and later evaluations cannot fully be accounted by dispositional differences in liking of others.

Another question of interest is whether the static-live association is driven by how likeable the confederate is in general. To test this, we used evaluations provided by respondents in the online survey who rated all confederate photographs but did not participate in the lab session (N=602) and computed a consensual likeability score for each confederate by averaging across the responders' liking scores. Liking of the confederate following the live interaction was positively associated with her consensual likeability based on the photograph, although marginally so (B = .826, SE = .444, $t(106)$ = 1.861, p = 0.065, *standardized coefficient* = .142). Importantly, the static-live association held after controlling for the confederate's consensual likeability (B = .469, SE = .063, $t(106)$ = 7.472, $p < 0.001$, *standardized coefficient* = .571). This suggests that participants' idiosyncratic biases in evaluations based on facial appearance play a

bigger role in judgments following live interactions than shared cues influencing the general likeability of the confederate.

Finally, is the static-live association accounted by attractiveness of the confederates? Although past work comparing judgments of attractiveness based on photographs and those based on short video clips produced mixed findings, they nonetheless suggest that we might observe consistency in judgments because participants might be assessing the confederate's likeability based on her attractiveness. Results showed a marginal positive relationship between perceived attractiveness of the confederate based on the photographs and judgments of liking following the live interaction (B = .108, SE = .056, $t(106) = 1.924$, $p = 0.057$, *standardized coefficient* = .184). However, controlling for perceived attractiveness of the confederate, liking based on the photograph significantly predicted liking following the live interaction (B = .397, SE = .078, $t(106) = 5.064$, $p < 0.001$, *standardized coefficient* = .483). This suggests that perceivers' evaluations based on photographs go beyond attractiveness of the confederates, but rather reflect an assessment of the perceived likeability of the person.

General Discussion

By showing that impressions from photographs predict impressions following live interactions, present research provides compelling evidence that facial appearance plays an important role in judgments. Why is there are sizeable association between impressions from photographs and impressions following live interactions? One possibility is participants might form conscious expectations about their interaction partner upon seeing her photograph and then during the interaction selectively attend to cues that might confirm those expectations (e.g., Darley & Gross; 1983) or elicit behaviors from the interaction partner that are in line with their initial expectations (e.g., Snyder et al., 1977). Another possibility is that cues pertaining to facial appearance, which are available both when making judgments based on photographs and judgments based on live interactions, are driving this association. Study 2 supports the latter interpretation by showing that judgments based on photographs predicted those following actual interactions that took place at least a month later. Participants who did not remember having seen

the person previously and who could not have formed conscious expectations about their interaction partner demonstrated a strong association between their initial impressions and later evaluations. Thus, our findings suggest that even after obtaining much richer information about another person through a live interaction, perceivers tend to "judge a book by its cover".

Although the present studies did not manipulate confederates' physical appearance, several aspects of the study designs increase our confidence in the conclusions that can be drawn from this work. First, we measured and controlled for several factors to account for alternative interpretations of the findings. We showed in Study 2 that the static-live association held when we controlled for confederates' attractiveness and general likeability as well as perceivers' tendency to evaluate others positively. Another strength of Study 2 is its preselection procedure, which ensured that the confederates interacted with both participants who liked them and those who disliked them based on the photograph. This makes it unlikely that any one characteristic of a given confederate that might consistently promote liking or disliking in perceivers is driving the static-live association. The large number of confederates used in Study 1 also decreases the likelihood that the static-live association is due to characteristics of confederates and increases the generalizability of current findings.

The present research provides evidence that facial appearance plays an important role in evaluations based not only on photographs but also on live interactions—even unstructured interactions that provide many opportunities to get to know another person. Given that important decisions such as employment offers and graduate student admissions are very often based on face-to-face interviews, these findings have profound policy implications for everyday decision-making.

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CHAPTER 5

GENERAL DISCUSSION AND FUTURE DIRECTIONS

Representations of unknown others, which is our mental image of how a person with certain attributes (e.g., trustworthiness, dominance) looks like and acts, guide our first impressions upon meeting a new person. The present research sheds light on how these representations influence person perception and impression formation from static photographs of faces to actual live interactions. Stored knowledge that informs representations of unknown others varies in whether it is idiosyncratic (i.e., in the eye of the beholder) or shared across perceivers. By investigating how facial resemblance to romantic partners affects snap judgments, Chapter 2 (Günaydin, Zayas, Selcuk, & Hazan, 2012) addressed the idiosyncratic aspects of representations of unknown others that typically vary from perceiver to perceiver. Using state-of-the-art morphing techniques to create objective facial resemblance to romantic partners, this research showed that unknown others whose face bore slight resemblance to one's romantic partner were judged more favorably than unknown others who did not. These results held even when individuals were not consciously aware of the resemblance. This research is the first to show that objective facial resemblance to a significant other is an important idiosyncratic cue that influences person perception automatically, effortlessly, and without conscious awareness.

Although idiosyncratic cues have a profound influence on first impressions of unknown others, in day-to-day person perception these cues are simultaneously processed with cues that are largely shared across perceivers. Chapter 3 investigated how facial resemblance to known others (an idiosyncratic cue) and facial width-to-height ratio (WHR; a shared cue) simultaneously influence person perception. To bridge seemingly disparate findings in the literature that showed processing multiple facial cues leads to additive effects in some tasks and interactive effects in others, the present work made a distinction between evaluative and categorical judgments. The results revealed that idiosyncratic and shared cues had additive effects on evaluative judgments—snap judgments of unknown others—whereas these cues had

interactive effects on categorical judgments—judgments of whether or not unknown faces resemble known individuals.

Across three studies, facial WHR was negatively associated with snap judgments of liking when it was simultaneously processed with facial resemblance to known others. However, the effect of resemblance to a known other depended on the *significance* of the known other. When unknown faces resembled newly encountered individuals, the resemblance affected evaluative judgments only when the newly encountered individual was described as engaging in blameworthy behaviors and was encountered in the exact same way (i.e., from a frontal viewpoint) as the physically similar unknown others. When the newly encountered individual was associated with positivity, even using a closeness-inducing live interaction, facial resemblance to this individual failed to affect snap judgments of unknown others. However, participants showed greater liking of unknown others when these individuals resembled their romantic partner (vs. not), suggesting that personal significance of the relationship influences the effect of the idiosyncratic cue.

When perceivers were asked to make categorical judgments instead of evaluative judgments, the shared and idiosyncratic cues interacted to influence processing efficiency. Specifically, participants made slower and less accurate responses to wider faces resembling a liked known other (vs. not). This provides evidence that an idiosyncratic cue indicating trustworthiness (resemblance to a liked acquaintance or one's romantic partner) is processed less efficiently when it is accompanied by a cue indicating untrustworthiness (a wider face). Overall, Chapter 3 is the first to systematically examine shared and idiosyncratic aspects of mental representations in the same paradigm and bridges seemingly conflicting findings in the literature by revealing under what conditions multiple cues lead to additive versus interactive effects.

In the introduction (Chapter 1), I argued that shared versus idiosyncratic knowledge informing mental representations of unknown others can be conceptualized as a function of whether perceivers go through similar or different experiences. If this is indeed the case, then even those representations that are thought to be shared across different perceivers should be

susceptible to change through idiosyncratic experiences. Research described in Chapter 3 showed that the negative association between facial WHR and judgments of liking was significantly attenuated for women who had romantic partners with wider faces. This provides evidence that even shared representations can be altered by having repeated idiosyncratic experiences that contradict these representations, suggesting that similarity of perceivers' experiences is a key to understanding the shared and idiosyncratic aspects of mental representations.

Although research described in Chapters 2 and 3 provided evidence that shared and idiosyncratic cues profoundly influence person perception, this work—along with the majority of research in person perception—focused on static photographs of faces (for a review see Macrae & Quadflieg, 2010). However, whether judgments based on photographs significantly predict judgments based on actual face-to-face interactions has not been previously tested. Studies described in Chapter 4 employed a within-participants design in which participants provided impressions of unknown individuals based both on photographs and on live interactions. Results revealed that impressions based on facial appearance judged from photographs significantly predicted impressions following face-to-face interactions—even when the interaction was geared toward getting to know the other person better. This research suggests that representations of facial appearance cues continue to influence impressions of unknown others even when richer information about these individuals is available through actual face-to-face interactions.

Research described in the empirical chapters opens up several interesting avenues for future research. One direction is to study how mental representations change over time as close relationships form and develop (e.g., Zayas, Shoda, & Günaydin, in preparation). For example, how do mental representations of unknown others change as we get to know these individuals through repeated interactions? Reverse correlation techniques, which are used to reveal how individuals mentally represent various social categories (Dotsch & Todorov, 2011), are particularly suited to shed light on this question. For example, individuals can be asked to interact with an unknown other multiple times and at the end of each interaction, to judge

whether faces superimposed with random noise resemble the newly met acquaintance. Averaging across patterns of noise that participants associate with their new acquaintance would reveal how fledgling mental representations change over time. With repeated favorable experiences with a new acquaintance, the average image tapping into the representation of this person should look increasingly trustworthy. In contrast, if the experiences with the new acquaintance are unpleasant, the representation of this person should become increasingly untrustworthy.

Reverse correlation techniques can also be used to investigate characteristics that distinguish mental representations of acquaintances from those of significant others. Based on work showing individuals tend to idealize their significant others (for a review see Gagne & Lydon, 2004), I would expect representations of significant others to be on average associated with cues indicating trustworthiness—such as resemblance to a happy facial expression—compared to representations of acquaintances.

Another exciting avenue for future work is to study the factors that facilitate the formation of significant other representations (e.g., Zayas et al., in preparation). Encountering an unknown other following a stressful (vs. non-stressful) experience (e.g., Beckes, Simpson, & Erickson, 2010) can lead to forming a favorable representation of the person given that stress-alleviation is an important function of close relationships (e.g., Selcuk, Zayas, Günaydin, Hazan, & Kross, 2012). Moreover, interactions involving mutual self-disclosures can lead to having favorable representations of newly met acquaintances (e.g., Aron, Melinat, Aron, Vallone, & Bator, 1997). Factors conducive to initial attraction such as similarity, familiarity, and reciprocity (for a review see Günaydin, Selcuk, & Hazan, in press) can also lead to forming a favorable representation of a newly encountered person. Hence, an interesting avenue for future work is to systematically investigate how these factors influence newly formed representations. By drawing on theory and research in social and cognitive psychology, research addressing these questions will shed light on how mental representations shape interpersonal cognition and behavior at various stages of relationship formation and development.

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