Journal of Experimental Psychology: Applied
2009, Vol. ●●, No. ●, 000–000

1076-898X/09/$12.00 DOI: 10.1037/a0014682

Exploring the Diagnostic Utility of Facial Composites: Beliefs of Guilt Can Bias Perceived Similarity Between Composite and Suspect

Steve D. Charman, Amy Hyman Gregory, and Marianna Carlucci
Florida International University

Facial composite research has generally focused on the investigative utility of composites—using composites to find suspects. However, almost no work has examined the diagnostic utility of facial composites—the extent to which composites can be used as evidence against a suspect. For example, detectives and jurors may use the perceived similarity of a suspect to a composite as evidence to determine the likelihood of a suspect's guilt. However, research in social cognition and models of cognitive coherence suggest that these similarity judgments may be biased by evaluators' preexisting beliefs of guilt. Two studies examined how preexisting beliefs of guilt influence similarity ratings between a suspect and a facial composite. Study 1 (n = 93) demonstrated that mock-investigators' beliefs in a suspect's guilt inflated their subsequent similarity ratings. Study 2 (n = 49) demonstrated that mock-jurors' beliefs in a defendant's guilt predicted their similarity ratings. These findings highlight a problem of using facial composites as evidence against a suspect, and demonstrate the malleability of similarity judgments.

Keywords: facial composites, similarity judgment, expectations, evidence

"*[Prior to this case] I had never seen a composite and photo that looked almost exactly alike*"

—27-year FBI veteran Private Investigator Gunner Askeland, describing in court the resemblance of a witness-generated composite to defendant Vishnu Persad, who spent two years in prison before all charges were dropped at a later retrial.

". . . completely and uncannily consistent"

—Prosecutor Moira Lasch, describing the similarity of the same composite to Persad.

Although innocent of the crime for which he was convicted, and thus not the person represented in the witness-generated facial composite, an FBI veteran and an established prosecutor (and, presumably, the jury in the original trial) perceived extremely high levels of similarity between Vishnu Persad and a composite of the actual perpetrator. How might we explain these perceptions of similarity? After all, Persad was not apprehended because he resembled the composite (instead, it was an anonymous tipster who originally led police to Persad's door), and thus any actual resemblance between Persad and the composite was purely coincidental. Was Persad simply unlucky enough to happen to resemble the composite of the perpetrator in this case? In fact, Persad's case may instead represent one instance of a phenomenon discussed in the current paper, specifically, that preexisting beliefs of guilt can inflate people's perceptions of similarity between a composite and an innocent suspect. To the extent that these inflated perceptions further increase beliefs of guilt, such a biasing effect can have serious consequences for innocent suspects.

Investigative Versus Diagnostic Realm

The justice system can be thought of as comprising two main roles: the investigation of a crime (e.g., procuring leads, finding suspects), and the prosecution of the offenders (or more generally, determining the guilt or innocence of a particular suspect). For purposes of this manuscript, we make a similar distinction, and refer to all procedures aimed at finding suspects as comprising the *investigative realm*, and all procedures aimed at determining the guilt or innocence of a particular suspect as comprising the *diagnostic realm*. The difference between the two realms largely hinges on timing; any given case is in the investigative realm before police focus on a specific suspect, and in the diagnostic realm thereafter. This is a meaningful distinction because at the moment that police begin to focus on a specific suspect, the goals and strategies used by people in the legal system change. The wide net that might have been cast in search of a suspect drastically narrows to concentrate on a single individual. This shift in strategies is often accompanied by a shift in the purpose of a given forensic procedure.

For example, the purpose of a facial composite (a depiction of the visual likeness of a perpetrator's face) depends on whether it is used as an investigative or diagnostic tool. A composite may be generated by a sketch artist or, as is increasingly more common, by the witnesses themselves via computerized software such as E-Fit, Mac-a-Mug, and FACES, or via physical systems, such as Photofit and IdentiKit, in which transparencies of various facial features can be superimposed over one another to create a facial likeness (see Davies &

Steve D. Charman, Amy Hyman Gregory, and Marianna Carlucci, Department of Psychology, Florida International University.

We thank Darcy Cosano, Staci Bernhard, Amy Mosca, Casandra Fitzgerald, and Vanessa Diaz for their help collecting data, and Amy Canatazaro for her helpful comments on an early draft of the manuscript.

Correspondence concerning this article should be addressed to Steve Charman, Department of Psychology, Florida International University, DM 296A, Miami, FL 33199. E-mail: charmans@fiu.edu

Valentine, 2006, for an overview). In most cases where the composite is generated by the witness, the witness creates a likeness of the perpetrator's face by selecting specific facial features (e.g., eyes, nose, mouth) from among a number of options, and combining them to produce a face (although see Frowd et al., 2007a, for exceptions to this procedure).

Composites as an investigative tool. Procuring composites serves at least two goals. The first and most obvious is that a well-constructed composite can be an investigative tool, as it might help police find the perpetrator, often by relying on someone in the public to recognize the face. Unfortunately, much empirical research has demonstrated that witness-generated composites are poorly recognized (e.g., Kovera, Penrod, Pappas, & Thill, 1997; for reviews see Davies & Valentine, 2006, and Wells & Hasel, 2007), especially after a forensically realistic delay (Frowd et al., 2005; Frowd, McQuiston-Surrett, Anandaciva, Ireland, & Hancock, 2007b). The general consensus among researchers is that facial composites do not look much like the person on whom they are based, possibly due to a mismatch between the holistic encoding of faces in memory and the feature-based nature of the composite-generation task (Tanaka & Farah, 2003; Wells & Hasel, 2007). In fact, facial composite generation may even be detrimental, as the process of generating a composite reduces the likelihood of later identifying the actual perpetrator from a lineup (Wells, Charman, & Olson, 2005). Consequently, some legal psychologists are skeptical concerning the ability of currently used composite-production systems to be potent investigative tools (although a new generation of such systems holds some promise; Davies & Valentine, 2006; Frowd et al., 2007a).

Composites as a diagnostic tool. The second goal of generating a facial composite, and one that has been largely overlooked by researchers, is that it may serve as evidence diagnostic of the guilt or innocence of a suspect. For example, a composite that is perceived to strongly resemble a suspect may (rightly or wrongly) lead investigators to pursue that suspect even more vigorously. In legal systems where composites may be shown to jurors at trial (such as the United States), jurors may also use the similarity of a facial composite to a suspect as evidence of that suspect's guilt or innocence. In fact, guidelines produced by the Association of Chief Police Officers, an advisory body for the U.K. constabulary, explicitly claim that a facial composite is "intended as an aid to the investigation of crime *together with provision of corroborative evidence*" (emphasis added; ACPO, 2000). Even the legal ruling *Neil v Biggers* (1972) explicitly mentions that the match between a suspect and the description of the perpetrator given by the witness is a factor to be considered when evaluating the accuracy of an eyewitness identification. To the extent that a facial composite is a pictorial representation of a witness's description, this ruling can be loosely read to indicate that the match between a composite and a suspect is diagnostic of guilt. Unfortunately, and in stark contrast to research investigating their investigative utility, almost no empirical research has examined the diagnostic utility of composites, examining, for example, how the match between a suspect and a composite leads investigators to adjust their beliefs in a suspect's guilt (although see McQuiston-Surrett, Douglass, & Burkhardt, 2008, for a recent exception).

The transition from the investigative realm to the diagnostic realm involves two important changes with respect to facial composites. First, because the transition occurs once police focus on a particular suspect, it is only at this point that an expectation is established in the minds of investigators. Prior to this point, in the investigative realm, composites are used to procure a suspect, and thus police have no specific expectations as to who the perpetrator is (apart from perhaps having a general description of the perpetrator, etc.). After this point, in the diagnostic realm, composites are used as evidence against a particular suspect, and thus police do have an expectation as to who the perpetrator is (i.e., the suspect). Second, the outcome measure of interest changes. In the investigative realm, we are concerned with the recognizability and familiarity of the composite. In the diagnostic realm, we are concerned with the similarity between the composite and a suspect. Because the bulk of facial composite research has focused on its investigative role, it has tended to examine whether participants with no (or few) preexisting expectations can recognize or name a person depicted in a composite. An analysis of the diagnostic utility of facial composites, on the other hand, raises an interesting question: Can expectations bias perceived similarity?

How Might Expectations Bias Perceived Similarity?

Previous research has shown that composite-constructors' beliefs about a target (specifically their liking or disliking of a target) can influence the composites they create, demonstrating the effect of top-down influences on judgments (Davies & Oldman, 1999; Shepherd, Ellis, McMurran, & Davies, 1978). Similar top-down influences may also occur among investigators who are asked to judge the similarity of a composite to a suspect. Research from both cognitive and social psychology support the idea that expectations—such as the preexisting beliefs of guilt or innocence of a suspect—may influence subsequent decisions. Specifically, current research regarding the emergence of coherence and classic studies about expectancy effects both predict such an influence. They are discussed in turn.

Coherence-based reasoning. A purely rational model of the assessment of diagnostic evidence would likely be based upon Bayesian statistics, with each new piece of evidence (exonerating or incriminating) adjusting the probability that the suspect is in fact guilty based on the diagnosticity of that evidence. In fact, such an analysis has been applied to eyewitness identification evidence (Wells & Olson, 2002). One of the assumptions of such a model is that decision-making is unidirectional: Evidence influences conclusions, but the emerging conclusion in no way affects the evaluation of evidence. This assumption, however, has recently been questioned by researchers who have demonstrated that decision-making often occurs bidirectionally, with evidence influencing conclusions, and emerging conclusions simultaneously influencing the evaluation of evidence (Holyoak & Simon, 1999; Simon, Pham, Le, & Holyoak, 2001; Simon, Snow, & Read, 2004). Consequently, people's evaluation of evidence begins to cohere with the emerging conclusion, as evidence that supports the conclusion grows stronger and evidence that supports an alternative conclusion grows weaker. With respect to composites, this coherence model predicts that evaluators who tentatively believe a suspect to be guilty should begin to interpret and weigh other

evidence coherently, thus perceiving more similarity between a composite and a suspect than actually exists. Conversely, evaluators who tentatively believe a suspect to be innocent should tend to see less similarity than actually exists.

Expectancy Effects. A long history of cognitive and social–cognitive research has demonstrated that a person's expectations, beliefs, and goals influence how they attend to, remember, and interpret subsequent information (Gilovich, 1991; Roese & Sherman, 2007; Stangor & McMillan, 1992). People's expectations have been shown to influence a diverse variety of judgments, including affective judgments (Wilson, Lisle, Kraft, & Wetzel, 1989), taste preferences (Lee, Frederick, & Ariely, 2006), interpretations of ambiguous or mixed behavioral information (Darley & Gross, 1983; Sagar & Schofield, 1980), attributions for ambiguous behaviors (Duncan, 1976), interpretations of facial expressions (Trope, 1986), the perception of ambiguous stimuli (Bruner & Minturn, 1955), and the perception of reversible images (Long & Toppino, 2004), to name only a few. As an example, consider the following sequence of letters—hijkl—and the following sequence of numbers – 5432l. Although the last character in each of the two sequences is objectively identical ("l"), most people's expectations lead them to read it differently—as the lower-case letter "L" in the former and the number "one" in the latter. The ambiguous character "l" is perceived in accordance with the expectation that it would represent either a letter or a number.

It is important to note that expectations are most likely to bias information processing when the information to be processed is ambiguous or mixed (Trope, 1986). These are precisely the conditions that exist when people make subjective similarity judgments of a composite to a suspect. Evaluators (e.g., detectives, jurors) have no completely objective way to quantify the degree to which a composite resembles a suspect, and are left to use whatever criteria they see fit. There is a certain degree of ambiguity with the judgment because the evaluator knows that a composite is not a perfect representation of the perpetrator and is thus free to determine how much latitude can be given when noting any discrepancies between the two. Evaluators may choose to emphasize or ignore any discrepancies at their discretion. Consequently, an expectation that a suspect is the person depicted in a composite—in other words, a preexisting belief in the suspect's guilt—may influence the evaluator's subjective similarity judgment. Specifically, people are likely to engage in the confirmation bias, selectively searching for only expectation-consistent information, and interpreting new information in a manner that makes it consistent with preexisting beliefs (Hoch & Ha, 1986; Nickerson, 1998). An evaluator with a belief that a suspect is guilty should thus tend to see more similarity between that suspect and a composite than an evaluator without such a belief.

It should be noted that coherence-based reasoning and expectancy effects are not at odds with one another, but in fact describe similar processes at different levels. Bidirectional decision-making resulting from a fundamental drive toward coherence is a general tendency that can describe how people make complex judgments (Simon et al., 2004). Expectancy effects are typically described in more circumscribed terms, describing how a specific expectation can bias a single relatively simple response. A biasing effect of preexisting beliefs on similarity judgments, then, may be described as a shift toward coherence or an expectancy effect. Because we believe the effects of preexisting beliefs of guilt on evidence evaluation to be widespread and not simply limited to similarity judgments per se, we describe these effects throughout the manuscript from a more general cognitive coherence perspective.

A Facial Recognition Perspective

Both the cognitive coherence and the expectancy effect accounts predict that any ambiguous evidence that may be loosely interpreted may be affected by one's preexisting beliefs. Thus, making a similarity judgment between a composite and a suspect is likely to be susceptible to such bias because it is an inherently subjective task, not because there is something about composites, faces, or similarity judgments per se that make them especially susceptible to being influenced. Nonetheless, the inherent subjectivity of a similarity judgment between a face and a composite may largely be due to certain facial recognition processes, and the general face perception literature, which investigates these processes, may consequently be germane to the current studies.

For example, it has been argued that as people are exposed to multiple images of a person's face, they develop a prototype of that person's face (Bruce, Burton, & Hancock, 2006). As one gains expertise with an individual's face, the manner in which that face is processed in memory shifts from a pictorial code (in which the face is largely represented by specific details of a particular "view" or "image" of the face) to a structural code (in which the face is represented as a more abstract prototype of the individual's face). Consequently, variations in image-specific facial details, such as lighting and viewpoint, tend to influence the recognition of unfamiliar, but not familiar, faces (e.g., Bruce, 1982; Hill & Bruce, 1996). To the extent that people who evaluate the similarity between a composite and suspect are unfamiliar with the suspect, then, their judgments of similarity are likely to be influenced largely by image-specific similarity between the image of the suspect and the composite, which should tend to be minimal or nonexistent. These similarity evaluators should thus tend to lack a strong internal basis for making similarity judgments. Consequently, they may be especially susceptible to other sources that may influence their similarity judgments, such as their preexisting beliefs in the suspect's guilt.

Furthermore, unfamiliar facial recognition tends to rely on external features of the face (such as hair and head shape) while neglecting internal features of the face; it is only as one gains familiarity with a face that recognition begins to rely on internal features of the face (Bruce et al., 2006; Ellis, Shepherd, & Davies, 1979; Frowd, Bruce, McIntyre, & Hancock, 2007). The inability of people unfamiliar with a face to extract meaningful information from its internal features suggests that people will have a difficult time comparing the similarity of those features to the corresponding features of a composite. Consequently, the relative difficulty and ambiguity of the task should render it susceptible to the influence of preexisting beliefs of guilt. Thus, the different theoretical approaches behind coherence-based reasoning, expectancy effects, and facial recognition tend to converge toward the same prediction that a belief in a suspect's guilt or innocence should tend to bias an evaluator's similarity judgments.

A Problem Within the Legal System

In actual criminal cases, it is certainly true that people who must evaluate the similarity between a composite and a suspect have

preexisting beliefs, and, if those beliefs influence their subsequent similarity judgments, they may have serious consequences. For example, a police officer who believes that a suspect is guilty may view a facial composite of the criminal and note the similarity between the composite's facial hair and the suspect's facial hair, but dismiss the dissimilarity between the composite's eyes and the suspect's eyes. A different police officer who believes in the innocence of the suspect may view the same composite and same suspect and note the dissimilarity of the eyes, but dismiss the similarity of the facial hair. The former police officer may then view the composite as diagnostic of guilt, possibly increasing the scrutiny directed toward the suspect, whereas the latter police officer may view the composite as diagnostic of innocence, possibly dropping the suspect from consideration. Depending on whether the suspect is actually guilty or innocent, one of these police officers has made a serious mistake—a mistake that stemmed from their preexisting beliefs of guilt. It is important to note that neither officer is likely to recognize the influence of those preexisting beliefs on their subsequent similarity judgments, as they should each tend to believe that it is the other's perception, and not their own, that is biased (Pronin, Gilovich, & Ross, 2004; Pronin, Lin, & Ross, 2002).

The current studies are some of the first attempts in the literature to examine some of the consequences of using facial composites as a diagnostic, as opposed to an investigative, tool. Specifically, the potentially biasing role that preexisting beliefs have on similarity judgments was examined across two studies, each one modeled after a scenario where people in the legal system must make similarity judgments.

Study 1: Investigators

A recent survey indicates that approximately one third of US police officers report comparing a composite to a suspect in order to evaluate the quality of the composite (McQuiston-Surrett, Topp, & Malpass, 2006). That police officers make these comparisons suggests that they believe the composite to have some diagnostic value. To determine whether investigators' beliefs of guilt may influence their similarity judgments (thus further biasing their beliefs that the suspect is guilty), participants in Study 1 were placed in the role of criminal investigators. Their beliefs concerning the guilt or innocence of a number of individuals were manipulated, and they were subsequently asked to rate the similarity between the composite and each of the individuals. Because these similarity judgments can affect how vigorously a suspect is pursued by police, it is of the utmost importance to determine whether they can be biased.

Method

Overview and Design

All participants were told that they were playing the role of an investigator and were led to believe that two other participants were playing the role of witnesses. To manipulate beliefs of guilt in a forensically realistic fashion, each participant was told that the two witnesses had viewed a mock crime and had been shown a four-person lineup from which to attempt an identification. The participant was either told that the witnesses both identified the same lineup member (and was told which lineup member had been ostensibly identified) or was not told anything about the other witnesses' identifications. The participant's role as investigator was to judge the similarity of each lineup member to a facial composite of the criminal, which had supposedly been created in a separate study. Thus, each participant made four similarity ratings. If beliefs in a suspect's guilt or innocence lead investigators to evaluate subsequent evidence in a coherent manner, then investigators who are told that witnesses identified a specific lineup member as being the criminal should subsequently perceive greater similarity between the identified lineup member and a composite of the criminal, and less similarity between each of the nonidentified lineup members and the composite, than investigators who are not told about other witnesses' identifications.

To ensure that any results were not specific to a particular composite, two facial composites, and thus two corresponding lineups, were created. Participants were randomly assigned to receive one of the two composites. To ensure that results were not specific to particular suspects, the specific lineup member who had been ostensibly identified by the other witnesses was randomly assigned to participants in the experimental conditions. Participants in the control condition were not given any information regarding any witness identifications.

Participants

Ninety-three undergraduate students (54 female and 39 male; age 17–32 years, $M = 20$, $SD = 3$) from a large southern university who were enrolled in a psychology course participated in the experiment. Participants self-identified as 69% Hispanic, 15% non-Hispanic White, 10% African American, and 6% Other. Participants received course credit for their participation.

Materials

Composites and lineups. Two composites—one with light hair and another with dark hair—were created using police composite-building software (FACES 4.0). The composites were not based on any specific individual or photograph, but were instead created to resemble a generic White, college-aged male face. A four-person lineup was created for each composite by selecting photographs of people who shared the same basic description as the composite (i.e., sex, race, approximate age, hair color and length). Participants in an earlier pilot test rated the similarity of each of the two composites to an array of photographs along a seven-point scale that ranged from "not very similar" to "very similar." The eight lineup members selected for this study were those whose similarity was rated at the approximate midpoint of the similarity scale (in order to minimize ceiling and floor effects). The two composites and their respective lineups can be seen in Figure 1. F1

Similarity questionnaire. Two questionnaires were created, one for control participants and one for experimental participants. The experimental questionnaire asked participants to rate each of the lineup members along various dimensions on seven-point scales, including their similarity to the composite (from "not similar at all" to "extremely similar"), the extent to which they stood out from the lineup (from "does not stand out at all" to "stands out a lot"), their likelihood of guilt (from "not at all likely" to "extremely likely"), and the strength of evidence against each of

tapraid5/zep-xap/zep-xap/zep00109/zep2072d09z | xppws | S=1 | 2/12/09 | 18:49 | Art: 2008-0157

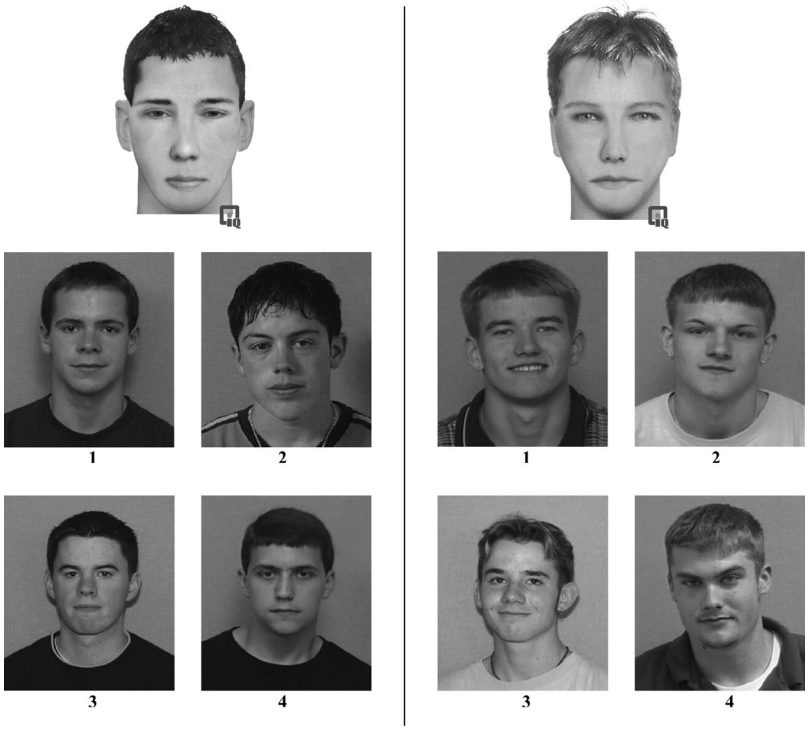

Figure 1. Composites and lineups of dark-haired suspects (on left) and light-haired suspects (on right) used in Study 1. Note that participants viewed a color version of the lineups.

them (from "no evidence at all" to "extremely strong evidence"). As secondary measures, the questionnaire also asked participants questions about their beliefs that the eyewitnesses made a correct identification (from "not at all likely" to "extremely likely") and their beliefs about whether they had been influenced by knowing the other witnesses' identifications (either "yes" or "no"). The control questionnaire was identical except that it omitted the last two questions (i.e., concerning the witness's identifications).

Procedure

Participants arrived to the lab in groups of three. They were informed that the experiment concerned the study of criminal investigations and that one of them would be randomly assigned to play the role of a criminal investigator and the other two would be randomly assigned to play the role of eyewitnesses. Participants were split up into separate rooms. A rigged drawing led each participant to believe that he or she had been randomly assigned to play the role of investigator (and hence believed that the other participants were playing the role of witnesses). The experimenter left the room and returned a few minutes later with a facial composite and a four-person lineup. All participants were randomly assigned to receive either a light-haired or dark-haired facial composite and its corresponding lineup. Participants were told that the other two eyewitnesses had both viewed the same crime and then had been shown a lineup. Participants in the experimental conditions were told the following:

> I've got some questions I would like you to answer and you will answer them using this lineup and this composite. This is the lineup that the other two witnesses saw. They both identified ____. This is a composite that was made last semester of the criminal. Please use these materials to answer the questions in the questionnaire.

In reality, the specific "identified" lineup member was randomly assigned for each participant and was always indicated as being the same for both witnesses. To ensure that participants were aware of the lineup member who had been ostensibly identified by the witnesses, the sheet on which the composite was printed had two lines that read "Witness ID _____." On each line, the lineup number of the ostensibly identified suspect was written in. Participants in the control condition were given the same instruction as above except that they were not given the sentence indicating who the other witnesses had identified, and the sheet on which the composite was printed did not have the other witnesses' identifications written in. All participants were then left with the composite and the lineup and asked to fill out the similarity questionnaire. Upon completion of the questionnaire, all participants were probed for suspicion, debriefed, and excused.

Results

Results for each of the composites—one dark-haired and one light-haired—are reported separately. Investigators' beliefs of guilt were manipulated as a function of which lineup member was ostensibly identified by the other two participants. The following nomenclature was used throughout the manuscript: "Identified suspect" refers to the lineup member whom each participant believed had been identified by the witnesses, and "nonidentified suspects" refers to all other lineup members. Because the identified

suspect varied between participants in order to systematically counterbalance the "guilty" suspect, the identified suspect does not refer to a specific person, but rather the average identified lineup member. Similarly, the nonidentified lineup members do not refer to specific lineup members, but rather refer to the average nonidentified lineup members. Thus, if learning about the witnesses' identifications had no effect on participants' judgments, the identified suspects and nonidentified suspects, on average, should look equally similar to the composite.

Within-Subjects Comparisons

Within-subjects analyses were performed to determine whether investigators perceived greater similarity between the identified suspect and the composite than between the nonidentified suspects and the composite. These analyses were necessarily only performed on investigators who were told that a lineup member had been identified (i.e., they do not include investigators in the control condition). Means are displayed in Table 1. T1

Collapsing across all suspects, paired *t* tests indicated that the investigators rated the identified suspect as more likely to have committed the crime than the nonidentified suspects, $t(76) = 5.23$, $p < .01$, $d = 1.20$, and thought that the evidence was stronger against the identified suspect than the nonidentified suspects, $t(76) = 6.43$, $p < .01$, $d = 1.48$. These results indicate that the manipulation was successful; the investigators believed that the other participants actually made an identification, and showed some sensitivity for the diagnostic value of those identifications.

Looking at similarity scores among the dark-haired suspects revealed that investigators perceived the identified suspect to be more similar to the dark-haired composite than the nonidentified suspects were to the same composite, $t(37) = 6.43$, $p < .01$, $d = 2.11$, and claimed that the identified suspect stood out more from the lineup than the nonidentified suspects, $t(37) = 4.25$, $p < .01$, $d = 1.40$. Similar results were found for the light-haired suspects. Investigators perceived the identified suspect to be more similar to the light-haired composite than the nonidentified suspects were to the composite, $t(38) = 4.38$, $p < .01$, $d = 1.42$, and reported that he stood out more from the lineup than the nonidentified suspects, $t(38) = 3.22$, $p < .01$, $d = 1.04$.

Between-Subjects Comparisons

Between-subjects analyses examined investigators' similarity ratings for a suspect as a function of whether investigators believed him to have been identified, believed someone else to have been identified, or were given no information about who had been identified. Throughout the Results section, suspects are numbered according to the labeling of the lineups in Figure 1. Mean similarity ratings and the results of statistical tests are displayed in Table 2. Overall similarity ratings (i.e., regardless of which individual suspect participants believed had been identified) are shown graphically in Figure 2. Due to the experimental design, sample sizes were necessarily unequal for many of the between-subjects comparisons (i.e., for any given suspect, more participants were made to believe that he had not been identified than participants made to believe that he had been identified), and consequently some conditions had unequal variances. Thus, Welch's *t* test was used for all analyses that involved substantially different sample sizes because it does not rely on the assumption of equal variances. This *t* statistic also adjusts the degrees of freedom associated with the statistical test; these adjusted degrees of freedom have been rounded to the nearest single degree of freedom throughout the Results section. T2 F2

Dark-haired composite. Overall, the belief that a lineup member had been identified significantly inflated similarity scores for the identified lineup member compared to the control condition. This effect was observed for two of the four individual suspects (Suspect 2 and Suspect 3) and was marginally significant for a third (Suspect 4). The effect was not significant for Suspect 1. The belief that a different lineup member had been identified significantly decreased similarity scores compared to the control condition overall. This effect was significant for Suspect 3, and marginally significant for Suspect 4. The effect was not significant for the remaining two suspects.

Light-haired composite. Overall, the belief that a lineup member had been identified significantly inflated the similarity scores of the identified suspect compared to the control condition. This effect was observed for three of the four individual suspects (Suspect 1, Suspect 2, and Suspect 3). The effect was not significant for Suspect 4. The belief that a different lineup member had been identified, however, did not significantly decrease similarity scores compared to control overall, nor for any of the individual suspects.

To summarize, the belief that a lineup member had been identified led to significantly higher similarity ratings for the identified lineup member for both composites overall, and for five of the eight individual suspects. The belief that a different lineup member had been identified led to significantly lower similarity ratings

Table 1
Mean Within-Subjects Similarity Scores (Standard Deviations in Parentheses) as a Function of Composite and Investigators' Beliefs About Whether the Suspect Had Been Identified or Not

	Dark-haired composite ($n = 38$)		Light-haired composite ($n = 39$)	
Question	Identified	Not identified	Identified	Not identified
Similarity	5.6 (1.2)	3.9 (1.2)	4.9 (1.7)	3.4 (1.1)
Stands out	5.0 (1.6)	3.6 (1.1)	4.8 (1.7)	3.7 (.9)
Strength of evidence	4.7 (1.8)	3.2 (1.2)	4.4 (1.6)	3.2 (1.1)
Likelihood of guilt	4.8 (1.4)	3.7 (1.0)	4.6 (1.6)	3.3 (.9)

Note. All scores were measured on a 1 (not at all similar) to 7 (extremely similar) scale.

Table 2
Mean Similarity Scores (Standard Deviations in Parentheses) as a Function of Investigators' Beliefs About Whether the Suspect Had Been Identified, and T-test Results for All Suspects

	Dark-haired suspect					Light-haired suspect				
	1	2	3	4	Overall	1	2	3	4	Overall
Belief about suspect[a]										
Identified	5.4 (1.3) $n = 7$	5.4 (1.7) $n = 13$	5.4 (.8) $n = 7$	6.0(.8) $n = 11$	5.6 (1.2) $n = 38$	5.1 (1.4) $n = 9$	5.6 (1.7) $n = 9$	4.6 (1.5) $n = 9$	4.3 (2.0) $n = 12$	4.8 (1.7) $n = 39$
Control	5.1 (1.1) $n = 8$	3.4 (1.3) $n = 8$	4.4 (1.1) $n = 8$	5.3 (1.3) $n = 8$	4.6 (.5) $n = 8$	3.0 (1.5) $n = 8$	2.8 (1.6) $n = 8$	1.8 (1.2) $n = 8$	4.9 (1.8) $n = 8$	3.1 (.8) $n = 8$
Not identified	4.5 (1.5) $n = 31$	3.8 (1.7) $n = 25$	3.1 (1.7) $n = 31$	4.1 (1.8) $n = 27$	3.9 (1.2) $n = 38$	3.8 (1.7) $n = 30$	3.5 (1.5) $n = 30$	2.1 (1.4) $n = 30$	4.2 (1.9) $n = 27$	3.4 (1.1) $n = 39$
Suspect identified vs Control										
t	.49	2.91	2.16	1.59	3.80	3.03	3.46	4.25	.62	4.48
df	13	19	13	17	26	15	15	15	18	23
p	.63	<.01	.05	.13	<.01	<.01	<.01	<.01	.54	<.01
d	.27	1.34	1.20	.77	1.49	1.56	1.77	2.19	.29	1.87
Suspect not identified vs Control										
t	1.35	.67	2.62	2.00	2.62	1.24	1.14	.79	.93	.78
df	14	16	18	16	24	12	11	13	12	14
p	.20	.51	.02	.06	.02	.24	.28	.44	.37	.45
d	.72	.34	1.24	1.00	1.07	.72	.69	.44	.54	.42

[a] All scores are measured on a 1 (not at all similar) to 7 (extremely similar) scale.

overall only for the dark-haired suspects, and for only one individual suspect (although the effect was marginal for one additional suspect).

Another way to look at the data is to examine the proportion of times a suspect received a high similarity rating (a 6 or a 7 on the similarity scale) as a function of whether they were believed to have been identified or someone else was believed to have been identified. Doing so revealed that 52% of the time that a suspect was thought to have been identified, he received a high similarity score (40/77). However, only 15% of the time that someone else was thought to have been identified did a suspect receive a high similarity score (35/231).

Tainted Perceptions of Other Evidence

In fact, the biasing effects of expectancies may go beyond their effects on similarity, and may taint the perceived strength of other evidence. For example, if beliefs of guilt lead to higher perceived similarity, this higher perceived similarity may lead investigators to believe more strongly in the accuracy of the eyewitnesses' identifications. Indeed, among investigators who were informed of the eyewitnesses' ostensible identifications, beliefs of guilt predicted beliefs in the accuracy of the eyewitnesses, $\beta = .34$, $t = 3.11$, $p < .01$. To test whether perceived similarity mediated this effect, Baron and Kenny's (1986) method of mediation analysis was used. This method assesses how much of the influence of an independent variable (i.e., beliefs of guilt) on a dependent variable (i.e., beliefs in the accuracy of the eyewitnesses) is transmitted through a mediator (i.e., perceived similarity). If the relationship is mediated, the direct effect between the independent and dependent variable should be significantly reduced when the mediator is added to the model. All conditions for mediation were met. Beliefs of guilt predicted similarity scores for the identified lineup member, $\beta = .45$, $t = 4.35$, $p < .01$. Similarity scores predicted belief in the accuracy of the eyewitnesses, even when controlling for beliefs of guilt, $\beta = .55$, $t = 5.32$, $p < .01$. Finally, the relationship between beliefs of guilt and beliefs in the accuracy of the eyewitnesses was reduced to nonsignificance when controlling for similarity ratings, $\beta = .09$, $t = .86$, $p = .39$. Sobel's (1982) test, which tests the significance of the magnitude of the mediated path, was indeed significant, $z = 3.34$, $p < .01$. These results are consistent with the notion that perceived similarity mediates the relationship between beliefs of guilt and beliefs in the accuracy of the eyewitnesses. This mediation may result in a positive feedback system: beliefs of guilt inflate perceived similarity, which increases belief in the accuracy of the eyewitnesses, which may further inflate beliefs of guilt (although the current data do not allow such an analysis).

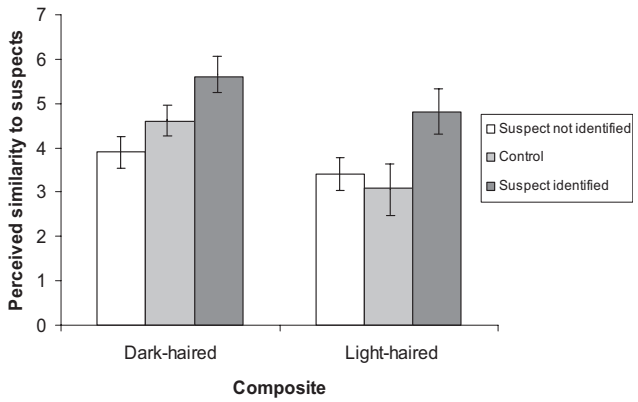

Figure 2. Investigators' overall mean similarity ratings as a function of composite and belief about whether the suspect had been identified by witnesses. Error bars represent 95% confidence intervals.

Awareness of Influence

To assess whether investigators showed any awareness of having been influenced, all participants who were told about the

witnesses' identifications were asked whether those identifications influenced their similarity ratings. If investigators actually had some awareness of influence, those who responded "yes" to this question should show a greater difference between the similarity of the identified suspect and the similarity of the nonidentified suspects than those who responded "no" to this question. Mean similarity scores are displayed in Table 3. A 2 (response to the awareness of influence question: yes vs. no) × 2 (suspect: identified suspect vs. nonidentified suspect) mixed ANOVA revealed a significant interaction, indicating that those investigators who reported having been influenced by the witnesses identifications were, in fact, more influenced than those investigators who reported having not been influenced, $F(1, 75) = 10.63$, $p < .01$, $\eta_p^2 = .124$. However, investigators' metacognitive abilities were not perfect. An analysis of simple main effects indicated that investigators who reported having not been influenced did nonetheless give significantly higher similarity ratings for the identified suspect than for the nonidentified suspects, $t(39) = 3.24$, $p < .01$, $d = 1.04$.

Discussion

Investigators' judgments of the similarity between a suspect and a facial composite tended to be influenced by their prior beliefs in the suspect's guilt. When investigators believed a lineup member to have been identified by two eyewitnesses, and thus likely to be the person depicted in the facial composite, their similarity scores tended to increase relative to a control condition (in which investigators did not receive any information concerning the eyewitnesses' identifications). This biasing pattern is consistent with the notion that expectations can influence the interpretation of subsequent information as well as the idea that emerging conclusions (i.e., that the suspect was the person depicted in the composite) can influence people's interpretation of evidence. Specifically, an emerging conclusion should lead people to evaluate evidence in a manner that coheres with the conclusion (i.e., that the suspect and composite are highly similar).

Beliefs of innocence only led to significantly lower similarity scores among participants who viewed dark-haired suspects, but not among participants who viewed light-haired suspects. There are at least two explanations for this difference. First, it may have been simply due to a floor effect, since control participants rated the average perceived similarity of light-haired suspects ($M = 3.1$ on a seven-point scale) as being significantly lower than the average perceived similarity of dark-haired suspects ($M = 4.6$; $t(14) = 4.29$, $p = .001$, $d = 2.29$).

Second, the failure of beliefs of innocence to lead to lower similarity scores among some suspects may be a consequence of the relative weakness of the manipulation. A belief that a suspect is guilty may produce strong pressures to evaluate evidence in a fashion that coheres with that belief because it leads to a strong conclusion: the suspect *must* be the person represented in the composite. However, a belief that a suspect is innocent leads to a relatively weaker conclusion, as it does not preclude a possible coincidental similarity between that innocent suspect and a composite. Therefore, there may be much less pressure to evaluate evidence coherently (i.e., to lower one's perception of similarity between the two faces), and consequently an effect of beliefs of innocence on similarity scores should be more difficult to obtain across stimuli. In fact, research examining the effects of postidentification feedback on witnesses' retrospective confidence has demonstrated a similar pattern—although confidence-inflation resulting from confirming feedback is consistent and easy to replicate, confidence-deflation resulting from disconfirming feedback is weaker and more unreliable (Douglass & Steblay, 2006). The asymmetric effects observed in both the current study and the feedback literature may stem from a common cause—incriminating information may lead to a stronger "conclusion" than exonerating information, producing a greater need to cohere and a greater biasing impact of that information.

The current study suggests that the problem associated with this biasing effect of expectations may be quite serious. The effects do not seem to be limited to specific face-composite pairings, since they significantly inflated the similarity of five out of eight suspects in this study (and had a marginally significant effect on a sixth) using two different facial composites. Of note, the three suspects for whom expectations of guilt did not significantly inflate similarity scores were the three suspects who had the highest similarity ratings to the composite in the control condition. In fact, post hoc analyses show a strong negative relationship between each suspect's similarity score (in the control condition) and the size of the biasing effect of preexisting beliefs of guilt, $r(8) = -.91$, $p < .01$. This analysis suggests that the similarity scores of suspects who are already perceived to be similar to a composite are less likely to be influenced by preexisting beliefs of guilt. There are at least two possible explanations for this finding. First, this differential effect across suspects might have been due to a ceiling effect—suspects who were already highly similar to a composite simply had less room on the similarity scale to increase. Second, the differential effect across suspects is also consistent with the principle that external influences on a judgment (such as knowledge of eyewitness identifications) have less impact when there are already strong preexisting cues for that judgment (such as high preexisting similarity), prevalent in general psychological theory (e.g., Bem, 1972; Festinger, 1954; Loftus, Miller, & Burns, 1978), as well as the eyewitness psychology field in particular (Bradfield, Wells, & Olson, 2002).

The observed biasing effect may be especially impressive considering the fact that the composites were not generated to represent any of the lineup members. Rather, the composite was created to match a generic description of an individual, using information about sex, race, age, hair color, and hair length, some of the most commonly given descriptors among actual eyewitnesses (Kuehn,

Table 3
Investigators' Similarity Ratings (Standard Deviations in Parentheses) for Suspects Believed to Have Been Identified and Non-Identified as a Function of Whether Investigators Reported Having Been Influenced or Not

Response	Identified suspect	Non-identified suspect
Influenced	5.8 (1.2)	3.5 (1.1)
Not influenced	4.7 (1.6)	3.7 (1.2)

Note. All scores are measured on a 1 (not similar at all) to 7 (extremely similar) scale.

1974). In addition, the composite was created using FACES, one of the most commonly used computer software programs among actual witnesses in the United States (McQuiston-Surrett et al., 2006). The findings suggest that facial composites created by actual witnesses may be susceptible to expectancy-driven biases in similarity judgments, leading even innocent suspects to resemble a composite.

Furthermore, the effect sizes associated with these biased ratings were quite large, with most falling between $d = 1.0$ and $d = 2.0$. Thinking a suspect had been identified more than tripled the likelihood that he received a high similarity score compared to when someone else was thought to have been identified. These effect sizes are even more impressive considering the relative weakness of the manipulation. In the current study, investigators' beliefs of guilt were only manipulated via two eyewitness identifications. Consequently, their mean belief in the guilt of the identified lineup member was only 4.7 on a one-to-seven scale, only slightly above the midway point. Real detectives, however, have often put in many hours and resources pursuing a suspect, and likely have developed extremely strong beliefs concerning the guilt of the suspect (Findley & Scott, 2006). If the biasing effect of expectations on similarity judgments is dependent on the strength of investigators' beliefs of guilt (and the regression analysis suggests that it is), then the current study likely underestimated its strength among real detectives.

On the other hand, it is also possible that professional investigators would be less susceptible to this influence than our college-aged participants given their much more extensive experience making similarity judgments between composites and suspects. There are few theoretical reasons to assume this to be the case, however. After all, a basic cognitive drive toward coherence and consistency is usually assumed to be more or less ubiquitous, at least within Western cultures (Heine & Lehman, 1997), and as such, investigators would not be any more exempt from its influence than college students. Furthermore, it is exceedingly unlikely that investigators are given any sort of training aimed at maintaining objectivity when making similarity judgments, and as such their natural tendency toward coherence is unlikely to be suppressed. Nonetheless, empirical studies demonstrating the biasing effects of beliefs of guilt on perceptions of similarity among actual investigators would provide further evidence as to the dangers of the biasing influence of beliefs of guilt on similarity perceptions.

Hints of such dangers can be seen from the mediation analysis of the current study. Once the expectation of guilt was established among our participant-investigators, it tended to inflate the perceived similarity between the suspect and the composite, in turn leading investigators to believe more strongly in the accuracy of the eyewitness identifications. By artificially inflating similarity, the effect of the eyewitness identification was ultimately to increase its own believability! The tendency for inflated similarity to increase the believability of an eyewitness identification is especially dangerous because the US legal system endorses using the similarity between a suspect and the witness's description of the criminal to assess the accuracy of the eyewitness's identification (*Neil v Biggers,* 1972). If these similarity assessments are inflated, the US legal system will put too much faith in the identification of an eyewitness. Consequently, once a belief of guilt is established, it may be quite difficult to de-rail, as those beliefs will influence the interpretation of subsequent evidence, likely resulting in even stronger beliefs of guilt.

There is one encouraging finding from this experiment, however. Investigators seemed to have some degree of awareness of the influence that the other witnesses had on their similarity judgments, as those who indicated (upon questioning) that they had been influenced were in fact more influenced than those who indicated that they had not been influenced. Nonetheless, two points should temper the optimism with which this finding is received. First, even investigators who responded that they were not influenced by the eyewitnesses' identifications in fact showed evidence of having been influenced. Thus, people were not completely aware of the extent to which they were influenced.

Second, whatever knowledge of influence investigators did have did not stop them from providing biased similarity scores. There is an important difference between *recognizing* that one was influenced after the fact, which participants in the current study did, and *counteracting* the bias, which participants in the current study apparently did not do. In order to do the latter, investigators must do one of two things. They could override the effects of influence before actually producing the influenced response (i.e., before comparing the suspect and composite). Research suggests that people are unlikely to do this unless either the bias is very salient (which, in the case of preexisting beliefs of guilt influencing similarity ratings, is unlikely) or there is a blatant warning to ignore the biasing influence (Stapel, Martin, & Schwarz, 1998). Other promising evidence suggests that people may be able to avoid being influenced prior to giving a response if they are given appropriate instructions (Charman, Carlucci, & Hyman, 2008; Lampinen, Scott, Pratt, Leding, & Arnal, 2007; Neuschatz et al., 2007). Alternatively, investigators could correct for the influence after having given a biased response (i.e., after comparing the suspect and composite). However, research suggests that people's post hoc corrections are based less on how they actually were influenced, and more on how they *think* they were influenced, beliefs which are often incorrect (Charman & Wells, 2008a; Petty & Wegener, 1993; Stapel et al., 1998; Wegener & Petty, 1995; Wilson & Brekke, 1994; Wilson, Centerbar, & Brekke, 2002).

Study 2: Jurors

It is not only criminal investigators that may produce biased similarity judgments as a result of preexisting beliefs of guilt. Any jury-eligible person in a country that allows composites to be entered as evidence (such as the US) may be put in a situation in which they are asked to make a similarity judgment. Imagine that a prosecutor shows a jury a facial composite of the perpetrator that was created by a witness, points to the defendant, and comments on the high degree of similarity between the two. Will the jurors' assumptions about the guilt of the defendant influence their similarity judgments? If jurors believe the defendant to be guilty (e.g., due to strong evidence), these beliefs of guilt may bias their similarity judgments, leading them to conclude that the defendant is highly similar to the facial composite. These inflated similarity judgments may prove to be extremely problematic for an innocent defendant to the extent that jurors use them as incriminating evidence. Study 2 was designed to assess whether jurors who believe in the guilt of a defendant give higher similarity ratings than jurors who believe in the innocence of a defendant.

tapraid5/zep-xap/zep-xap/zep00109/zep2072d09z | xppws | S=1 | 2/12/09 | 18:49 | Art: 2008-0157

Method

Overview and Design

Participants played the role of mock jurors and read about a case against a defendant. Their beliefs in the defendant's guilt were measured. They subsequently made similarity judgments between a photo of the suspect and a composite of the perpetrator. If beliefs of guilt bias similarity ratings, then participants who believe the defendant to be guilty should perceive greater similarity between the defendant and the composite than participants who believe the defendant to be innocent.

Participants

Forty-nine undergraduate students (34 female and 15 male; age 17–36 years, $M = 21$, $SD = 3$) from a large southeastern university who were enrolled in a psychology course participated in the study. Participants self-identified as 71% Hispanic, 14% non-Hispanic White, 6% African American, and 6% Other. Participants received course credit for their participation.

Materials

Participants received one of three case summaries, which varied in terms of the strength of the evidence against the defendant (see Appendix A). All participants saw a photograph of a White, college-aged male and a facial composite (see Figure 3). The facial composite was created with FACES 4.0, with the stipulation that it resemble the basic description of the defendant (i.e., a White, college-aged male with short hair and a goatee).

Procedure

Participants were randomly assigned to read one of three case summaries concerning a crime that ostensibly took place in West Palm Beach in 2006. In fact, the crime description was created for the purposes of this study. After reading about the crime, participants indicated their beliefs in the likelihood of guilt of the defendant on a 7-point scale (from "not at all likely" to "extremely likely"), as well as on a dichotomous guilty/not guilty verdict measure.

Participants were then shown a photograph, and were told that it was the booking photograph that was taken of the defendant. They were also shown a facial composite that they were told had been created by the victim on the day of the crime. Participants were then asked to make a similarity judgment (on a 1-to-7 scale) between the photograph and the facial composite. Participants could view the composite and photograph while making their judgment. After making their similarity judgment, participants were probed for suspicion and debriefed.

Figure 3. Picture of defendant and composite used in Study 2. Note that participants viewed a color picture of the defendant.

Results and Discussion

When comparing the photograph of the defendant to the facial composite, mock-jurors who believed the defendant to be guilty (on the dichotomous verdict measure) gave significantly higher similarity ratings ($M = 5.0$) compared to mock-jurors who believed the defendant to be not guilty ($M = 4.1$), $t(47) = 2.50$, $p = .02$, $d = .73$. Looking at the continuous likelihood of guilt measure produced a similar finding: A regression analysis indicated that perceived likelihood of guilt significantly predicted similarity scores, $\beta = .36$, $t = 2.66$, $p = .01$. Because both verdict and likelihood of guilt measures were always assessed before participants viewed either the facial composite or the photograph of the defendant, the most parsimonious explanation for these results is that the participants' beliefs of guilt influenced their subsequent similarity ratings. The more likely they believed the defendant to be guilty, the more similar to the facial composite they believed him to be, despite the fact that the facial composite did not depict the defendant.

General Discussion

Two studies, using methodologies modeled after two different scenarios that commonly arise within many legal systems, clearly indicated that preexisting beliefs of guilt can influence perceptions of similarity between an individual and a facial composite. Study 1 showed that investigators' beliefs that two witnesses identified a specific lineup member tended to inflate their perceptions similarity of that lineup member to a facial composite. Study 2 showed that jurors' beliefs in the guilt of a defendant predicted their similarity ratings between that defendant and a composite. Both of these effects occurred despite the fact that the facial composite was not a representation of any specific person.

According to researchers who endorse a coherence-based model of human decision-making (e.g., Holyoak & Simon, 1999; Simon et al., 2004), knowledge that the eyewitnesses identified a specific suspect led participants to form a tentative conclusion—that the composite is a depiction of that suspect. In an attempt to maintain coherence, participants then interpreted subsequent evidence in a manner consistent with that conclusion. Because the only other evidence they encountered was the similarity between the composite and the suspect, they tended to perceive more similarity between the identified lineup member and the composite than actually existed.

The biasing effect of expectations on similarity judgments may be exacerbated by an interesting tendency suggested by the data. Just as people have a tendency to perceive high levels of similarity

between a vague statement about personality and themselves (known as the Barnum effect; Dickson & Kelly, 1985), so too may people have a natural tendency to perceive similarity between a generic facial composite and almost any individual face that matches the basic qualities of the composite. Indeed, many participants tended to see at least moderate levels of similarity between random pairings of a generic composite and individual faces. Among Study 1 investigators in the control condition, the average similarity ratings for the suspects were 3.1 for the light-haired composite and 4.5 for the dark-haired composite. Among Study 2 jurors in the control condition, the average similarity rating between the defendant and the composite was 4.4. These scores were both measured on a one-to-seven scale, suggesting at least moderate levels of perceived similarity (indeed, the average similarity ratings for two of the three composites were greater than the scale midpoint), despite the fact that the composite was not based on any of the suspects. Readers may even be able to experience this phenomenon for themselves. Comparing the composites to each of the individual suspects in Figure 1, one may subjectively sense a degree of similarity for each pairwise comparison. It may be that people's tendency to seek coherence by perceiving more similarity than is warranted capitalizes on the natural tendency to perceive a moderate degree of similarity between a suspect and a generic composite, exacerbating the effect of beliefs of guilt on their similarity judgments.

If this effect is indeed exaggerated by generic-looking composites, then it is possible that the current results may not generalize to conditions in which composites are more distinctive. Such a situation could arise for at least two reasons. First, if other facial composite software programs or sketch artists produce more distinctive-looking composites compared to those created by FACES 4.0, similarity judgments involving those distinctive composites may be less susceptible to the biasing influence of preexisting beliefs of guilt than the current studies suggest. Although most research that has evaluated facial composite systems has done so by examining recognition rates of composites (via spontaneous or cued naming of the person depicted in the composite, matching of the composite to a photograph, or likeness ratings), and not via distinctiveness scores per se, one may tentatively assume that an increased ability to match a composite to a particular target is a result of the increased distinctiveness of the composite. If so, then research suggests that certain composite-production systems, such as PRO-Fit, Identikit, 2000, Evo-FIT, and sketch artists may result in more distinctive composites than FACES (Frowd et al., 2005, 2006; Frowd et al., 2007b). Consequently, similarity judgments between suspects and facial composites produced by these systems may be less susceptible to the biasing effect of expectations of guilt.

Second, the composites used in the current studies were specifically created to be generic; if actual witnesses and victims tend to produce more distinctive composites than those created in the current experiments, the current studies may have overestimated the biasing influence of beliefs of guilt on similarity ratings. It would be necessary to use witness-generated composites in future studies to test this possibility. Apart from the distinctiveness of the composite, there are undoubtedly many other moderators that may strengthen or weaken the biasing influence of beliefs of guilt on similarity assessments (e.g., an evaluator's familiarity with the suspect, the strength of an investigator's beliefs of guilt). Researchers may wish to identify others in order to estimate the prevalence and severity of this bias among investigators and jurors.

Theoretical Implications

The general notion that expectations can lead to active attempts to confirm those expectations is not new among legal psychologists. Selectively searching for expectation-consistent information, and ignoring expectation-inconsistent information, is a common problem within the legal system (Findley & Scott, 2006). Lineup administrators may purposefully or inadvertently seek expectation-consistent information by influencing the witness to identify the suspect (Greathouse & Kovera, in press; Phillips, McAuliff, Kovera, & Cutler, 1999; Russano, Dickinson, Greathouse, & Kovera, 2006). Criminal investigators' expectations of guilt can lead them to engage in interrogative practices that lead even innocent people to falsely confess (Kassin, Goldstein, & Savitsky, 2003; Meissner & Kassin, 2004). Numerous cases involving the interviewing of children have shown that investigators' beliefs about what occurred, even if incorrect, often leads them to ask questions in a fashion that elicits the responses they expected (Ceci & Bruck, 1995). However, in each of these examples, expectations lead people to engage in a certain interaction style in an attempt to elicit behavioral confirmation from another person. The current studies reveal the influence of expectations to be even broader, demonstrating that expectations can influence a simple perceptual comparison between two objective stimuli. The relatively constrained nature of a similarity judgment task may have made it appear more immune to the influence of expectancy-driven processes.

In fact, it has been largely implicitly assumed among eyewitness researchers that similarity judgments are fixed variables. For example, according to the WITNESS model, a mathematical model that attempts to describe eyewitness behavior from a lineup, the similarity between a lineup member and the witness's memory of the criminal is a single parameter that represents the proportion of features that are common to both the lineup member and the criminal (Clark, 2003). It is important to note that this similarity parameter is purely a function of bottom-up, featural components, and does not account for the top-down expectation-driven influences, such as those demonstrated in the current studies, that may alter similarity. Similarly, attempts to derive similarity measures between faces have also tended to treat similarity as a function of featural components (e.g., Tredoux, 2002). In fact, we are aware of only one other attempt within the general eyewitness psychology field to investigate the malleability of similarity judgments (Charman & Wells, 2008b). Under conditions in which similarity assessors do not have preexisting beliefs, bottom-up models of similarity may be quite successful. However, as the current studies demonstrate, these judgments can be malleable when people have preexisting biases, at least with respect to facial composites. Researchers may wish to examine other factors that influence similarity judgments, as well as the situations under which they will be influenced.

Practical Implications

The practical implications of these studies are chilling. Innocent suspects who happen to catch the suspicious eye of a detective may find themselves caught in a vicious circle. An early belief in a

suspect's guilt can lead an investigator to interpret a composite as being highly similar to the innocent suspect, in turn further increasing beliefs in the suspect's guilt. Furthermore, those beliefs can then lead the detective to perceive other evidence against the suspect (e.g., an eyewitness identification, e.g.) as being even more believable. If the suspect goes to trial on the basis of this evidence, the same pattern may play out for jurors: The eyewitness identification may lead jurors to believe that the suspect is guilty, leading them to see a high degree of similarity between the defendant and the composite. These artificially inflated similarity judgments may then increase their beliefs in the suspect's guilt, as well as their beliefs in the accuracy of the eyewitness. Further, although perhaps the most obvious negative effect of this bias is to increase the risk of false imprisonment to an innocent suspect, it can also hamper the apprehension of perpetrators as well, since any increased vigilance toward an innocent suspect results in decreased efforts toward capturing the real perpetrator.

It is, consequently, important to develop ways of minimizing the negative consequences associated with preexisting expectations. Unfortunately, this task will not be easy. The problem may be particularly insidious and intractable for two reasons. First, it is simply difficult to observe either the bias itself or the consequences of the bias. This is in contrast to many other types of bias. For example, giving witnesses confirming feedback following a lineup identification has been shown to bias their reports of confidence, their beliefs of how good a view they had, and so forth (Douglass & Steblay, 2006; Wells & Bradfield, 1998). However, the bias itself is usually easily definable—it is the confirmatory statement given by the lineup administrator to the witness following the identification, which can be detected post hoc if the identification procedure itself is recorded. The outcome of the bias is also often obvious—the inflation of confidence and other testimony-related judgments between the time of identification and testimony in court, which again can be detected if the witness's confidence is assessed at the time of the identification.

A similarity judgment, on the other hand, is a nebulous task that may not take place at one specific moment, but likely develops over time. It involves factors that are largely subjective and not easily quantifiable, such as the extent to which the investigator or juror believes in the guilt of a particular suspect. And because the judgment usually takes place only in the mind of an individual, there is no record of its occurrence. The primary effect it has on the individual—an artificially inflated perception of similarity—is not seen by outside observers. The observable effects of the bias will tend to be an increased vigilance with which the investigator pursues a particular suspect, or an increased likelihood of a juror giving a guilty verdict. But because it cannot be known how vigilantly investigators *would have* pursued the suspect had they not had expectations of guilt preceding their similarity judgments, or how likely jurors *would have* been to vote guilty had they not had expectations of guilt preceding their similarity judgments, it may be impossible to assess the impact of the bias on any given person.

Second, similarity assessments may be virtually unavoidable. As long as there are facial composites, detectives will look at them; it would be unreasonable to ask a detective dealing with a suspect to not look at a composite of the criminal. And although some countries' legal systems often explicitly prohibit composites from being shown to jurors (such as in the U.K.), this practice is commonplace in other legal systems (such as in the US). Even if detectives and jurors were asked to not make a similarity judgment when looking at the composite, the process is probably largely automatic and unavoidable. And although investigators in Study 1 at least showed some degree of awareness for the bias, even those who claimed they were not biased still showed evidence of having been influenced by their expectations of guilt, suggesting that at some level the bias was operating below their awareness. Other recent research has demonstrated that influenced people are not always aware of how they were influenced by certain variables, and may have difficulty correcting for them (Charman & Wells, 2008a). Clearly, researchers attempting to eliminate this bias have their work cut out for them.

Nonetheless, one possibly effective strategy to reduce the bias that avoids many of the problems mentioned above may be to have people look not only at a composite and the suspect, but to make multiple comparisons between the composite and numerous individuals. An investigator could compare a composite not just to the suspect, but also to lineup fillers. A defense attorney could also instruct the jury to compare the composite to the lineup fillers. In so doing, investigators and jurors may realize that composites have a natural tendency to resemble many individuals who match the basic description of the suspect, simply by virtue of their generic nature. It is possible that the perceived diagnostic value of the similarity between the composite and the suspect in particular will be attenuated through these multiple comparisons, thus mitigating the biasing effect of expectations on people's similarity judgments. The actual effectiveness of such a strategy is, however, speculative and in need of empirical investigation.

Results from these studies may help to resolve a minor paradox: If, as research suggests, composites are such poor representations of criminals, why do police continue to believe in their accuracy and use them to find suspects? For example, a composite generated in a 2002 homicide case has been touted as being an example of the accuracy of composites (Roth, 2007; the composite and the perpetrator can be viewed at http://www.postgazette.com/pg/07084/772371–84.stm). To most people, however, the composite probably looks extremely nondescript. Why, then, is it proclaimed by some detectives to be highly accurate? It may simply be that when police capture a suspect and compare the suspect to a witness-generated facial composite, their beliefs about the guilt of the suspect lead them to see more similarity between the two than actually exists. It may seem, therefore, that the composite, although perhaps not leading to the capture of this particular suspect, could have had some investigative utility, reaffirming the view that composites in general are accurate and useful. Even if composites have no investigative utility at all, the misperception that they are useful in hindsight, resulting from inflated perceptions of similarity, can maintain their use.

An understanding of the dual purposes composites can have—as an investigative tool used to find suspects, and as a diagnostic tool used to provide evidence against a particular suspect—illuminates yet another problem with using composites for their diagnostic utility. A composite that is released to the public (as an investigative tool) will tend to procure suspects that resemble the composite. However, detectives may then use that very resemblance as evidence against the suspects (using the composite as a diagnostic tool). Given that composites are typically poor representations of the actual criminal (Davies & Valentine, 2006), this will often lead

to the apprehension of innocent people who happen to look like a composite, who are then further believed to be guilty because they resemble the composite! Using the same facial composite as both an investigative and a diagnostic tool may be a dangerous procedure, independently of any biasing effect of preexisting beliefs of guilt.

In fact, other forensic procedures that are used simultaneously as an investigative tool and a diagnostic tool may be dangerous as well. For example, a detective who pressures potential suspects into providing an alibi for the time of a crime (thus using an alibi as an investigative tool), may encourage an innocent alibi-provider to report memories that she is uncertain of in an attempt to satisfy the detective's demands. If, upon further investigation, the detective uncovers evidence that contradicts details from her alibi, that inaccuracy may be used as evidence against her (thus using the alibi as a diagnostic tool), not realizing that the reason for the inaccuracy was the fact that he used her alibi as an investigative tool in the first place. An understanding of the distinction between the investigative and diagnostic realms, then, and the different motivations and strategies of detectives and potential suspects that accompany each one, is important for understanding how certain procedures may inadvertently bias police against an innocent person.

It is hoped that the focus of the current research encourages other researchers to examine other consequences of using facial composites as a diagnostic tool, as opposed to solely an investigative tool. Given the ubiquity with which facial composites are implicitly perceived to have diagnostic value among people in the legal system, the dearth of research on this topic is both surprising and in need of remedy. The current studies are the first to examine one of the consequences of using facial composites for their diagnostic utility, demonstrating one way that this use may result in bias among investigators and jurors, potentially endangering innocent suspects. This is, however, not to say that facial composites have no diagnostic value; it is quite likely that the more a composite resembles a suspect, the greater are the chances that the suspect is guilty. Just how much utility they have, and whether people in the legal system can be correctly attuned to it, are open empirical questions.

References

ACPO (2000). National Working Practices in Facial Imaging. Association of Chief Police Officers (Scotland) Working Group, unpublished document.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–62). New York: Academic Press.

Bradfield, A. L., Wells, G. L., & Olson, E. A. (2002). The damaging effect of confirming feedback on the relation between eyewitness certainty and identification accuracy. *Journal of Applied Psychology, 87,* 112–120.

Bruce, V. (1982). Changing faces: Visual and non-visual coding processes in face recognition. *British Journal of Psychology, 73,* 105–116.

Bruce, V., Burton, M., & Hancock, P. (2006). Remembering faces. In R. C. L. Lindsay, D. F. Ross, J. D. Read, & M. P. Toglia (Eds.) *Handbook of eyewitness psychology: Memory for people* (pp. 87–100). Mahwah, NJ: Erlbaum.

Bruner, J. S., & Minturn, A. L. (1955). Perceptual identification and perceptual organization. *Journal of General Psychology, 53,* 21–28.

Ceci, S. J., & Bruck, M. (1995). *Jeopardy in the courtroom: A scientific analysis of children's testimony.* Washington, DC: American Psychological Association.

Charman, S. D., Carlucci, M., & Hyman, A. (2008). *Recanted feedback as a strategy to eliminate the post-identification feedback effect.* Manuscript in preparation, FL International University, Miami.

Charman, S. D., & Wells, G. L. (2008a). Can eyewitnesses correct for external influences on their lineup identifications? The actual/counterfactual assessment paradigm. *Journal of Experimental Psychology: Applied, 14,* 5–20.

Charman, S. D., & Wells, G. L. (2008b, March). *Boosting eyewitnesses' identification confidence by adding dissimilar fillers: Examining the dud-alternative effect in lineups.* Paper presented at the American Psychology-Law Society, Jacksonville, FL.

Clark, S. E. (2003). A memory and decision model for eyewitness identification. *Applied Cognitive Psychology, 17,* 629–654.

Darley, J. M., & Gross, P. H. (1983). A hypothesis-confirming bias in labeling effects. *Journal of Personality and Social Psychology, 44,* 20–33.

Davies, G., & Oldman, H. (1999). The impact of character attribution on composite production: A real world effect? *Current Psychology: Developmental, Learning, Personality, Social, 18,* 128–139.

Davies, G., & Valentine, T. (2006). Facial composites: Forensic utility and psychological research. In R. C. L. Lindsay, D. F. Ross, J. D. Read, & M. P. Toglia (Eds.) *Handbook of eyewitness psychology: Memory for people* (pp. 59–83). Mahwah, NJ: Erlbaum.

Dickson, D. H., & Kelly, I. W. (1985). The 'Barnum Effect' in personality assessment: A review of the literature. *Psychological Reports, 57,* 367–382.

Douglass, A. B., & Steblay, N. (2006). Memory distortion in eyewitnesses: A meta-analysis of the post-identification feedback effect. *Applied Cognitive Psychology, 20,* 859–869.

Duncan, B. L. (1976). Differential social perception and attribution of intergroup violence: Testing the lower limits of stereotyping of Blacks. *Journal of Personality and Social Psychology, 34,* 590–598.

Ellis, H., Shepherd, J. W., & Davies, G. M. (1979). Identification of familiar and unfamiliar faces from internal and external features: Some implications for theories of face recognition. *Perception, 8,* 431–439.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7,* 117–140.

Findley, K. A., & Scott, M. S. (2006). The multiple dimensions of tunnel vision in criminal cases. *Wisconsin Law Review, 2,* 291–397.

Frowd, C. D., Bruce, V., McIntyre, A., & Hancock, P. (2007). The relative importance of external and internal features of facial composites. *British Journal of Psychology, 98,* 61–77.

Frowd, C. D., Bruce, V., McIntyre, A., Ross, D., Fields, S., Plenderleith, Y., et al. (2006). Implementing holistic dimensions for a facial composite system. *Journal of Multimedia, 1,* 42–51.

Frowd, C. D., Bruce, V., Ness, H., Bowie, L., Paterson, J., Thomson-Bognar, C., et al. (2007a). Parallel approaches to composite production: Interfaces that behave contrary to expectation. *Ergonomics, 50,* 562–585.

Frowd, C. D., Carson, D., Ness, H., McQuiston-Surrett, D., Richardson, J., Baldwin, H., et al. (2005). Contemporary composite techniques: The impact of a forensically-relevant target delay. *Legal and Criminological Psychology, 10,* 63–81.

Frowd, C. D., McQuiston-Surrett, D., Anandaciva, S., Ireland, C. E., & Hancock, P. J. B. (2007b). An evaluation of US systems for facial composite production. *Ergonomics, 50,* 1987–1998.

Gilovich, T. (1991). How we know what isn't so: The fallibility of human reason in everyday life. New York: Free Press.

Greathouse, S. M., & Kovera, M. B. (in press). Instruction bias and lineup

presentation moderate the effects of administrator knowledge on eyewitness identification. *Law and Human Behavior.*

Heine, S. J., & Lehman, D. R. (1997). Culture, dissonance, and self-affirmation. *Personality and Social Psychology Bulletin, 23,* 389–400.

Hill, H., & Bruce, V. (1996). Effects of lighting on the perception of facial surfaces. *Journal of Experimental Psychology: Human Perception and Performance, 22,* 986–1004.

Hoch, S. J., & Ha, Y. (1986). Consumer learning: Advertising and the ambiguity of product experience. *Journal of Consumer Research, 13,* 221–233.

Holyoak, K. J., & Simon, D. (1999). Bidirectional reasoning in decision making by constraint satisfaction. *Journal of Experimental Psychology: General, 128,* 3–31.

Kassin, S. M., Goldstein, C. C., & Savitsky, K. (2003). Behavioral confirmation in the interrogation room: On the dangers of presuming guilt. *Law and Human Behavior, 27,* 187–203.

Kovera, M. B., Penrod, S. D., Pappas, C., & Thill, D. L. (1997). Identification of computer-generated facial composites. *Journal of Applied Psychology, 82,* 235–246.

Kuehn, L. L. (1974). Looking down a gun barrel: Person perception and violent crime. *Perceptual & Motor Skills, 39,* 1159–1164.

Lampinen, J. M., Scott, J., Pratt, D., Leding, J. K., & Arnal, J. D. (2007). 'Good, you identified the suspect, but please ignore this feedback': Can warnings eliminate the effects of post-identification feedback? *Applied Cognitive Psychology, 21,* 1037–1056.

Lee, L., Frederick, S., & Ariely, D. (2006). Try it, you'll like it: The influence of expectation, consumption, and revelation on preferences for beer. *Psychological Science, 17,* 1054–1058.

Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into visual memory. *Journal of Experimental Psychology: Human Learning and Memory, 4,* 19–31.

Long, G. M., & Toppino, T. C. (2004). Enduring interest in perceptual ambiguity: Alternating views of reversible figures. *Psychological Bulletin, 130,* 748–768.

McQuiston-Surrett, D., Douglass, A., & Burkhardt, S. G. (2008). Evaluation of facial composite evidence depends on the presence of other case factors. *Legal and Criminological Psychology, 13,* 279–298.

McQuiston-Surrett, D., Topp., L. D., & Malpass, R. S. (2006). Use of facial composite systems in US law enforcement agencies. *Psychology, Crime, & Law, 12,* 505–517.

Meissner, C. A., & Kassin, S. M. (2004). "You're guilty, so just confess!" Cognitive and behavioral confirmation biases in the interrogation room. In G. D. Lassiter (Ed.), *Interrogations, confessions, and entrapment* (pp. 85–106). New York: Kluwer Academic/Plenum Press Publishers.

Neil v. Biggers, 409 US 188 (1972).

Neuschatz, J. S., Lawson, D. S., Fairless, A. H., Powers, R. A., Neuschatz, J. S., Goodsell, C. A., & Toglia, M. P. (2007). The mitigating effects of suspicion on post-identification feedback and on retrospective eyewitness memory. *Law and Human Behavior, 31,* 231–247.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many disguises. *Review of General Psychology, 2,* 175–220.

Petty, R. E., & Wegener, D. T. (1993). Flexible correction processes in social judgment: Correcting for context-induced contrast. *Journal of Experimental Social Psychology, 29,* 137–165.

Phillips, M. R., McAuliff, B. D., Kovera, M. B., & Cutler, B. L. (1999). Double-blind photoarray administration as a safeguard against investigator bias. *Journal of Applied Psychology, 84,* 940–951.

Pronin, E., Gilovich, T., & Ross, L. (2004). Objectivity in the eye of the beholder: Divergent perceptions of bias in self versus others. *Psychological Review, 111,* 781–799.

Pronin, E., Lin, D. Y., & Ross, L. (2002). The bias blind spot: Perceptions of bias in self versus others. *Personality and Social Psychology Bulletin, 28,* 369–381.

Roese, N. J., & Sherman, J. W. (2007). Expectancy. In A. W. Kruglanski and E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 91–115). New York: Guilford Press.

Roth, M. (2007, March 25). Why police composites don't always hit mark. *Pittsburgh Post-Gazette*. Retrieved April 16, 2008, from http://www.post-gazette.com/pg/07084/772371–84.stm

Russano, M. B., Dickinson, J. J., Greathouse, S. M., & Kovera, M. B. (2006). "Why don't you take another look at number three?" Investigator knowledge and its effects on eyewitness confidence and identification decisions. *Cardozo Public Law, Policy, and Ethics Journal, 4,* 355–379.

Sagar, H. A., & Schofield, J. W. (1980). Racial and behavioral cues in black and white children's perceptions of ambiguously aggressive acts. *Journal of Personality and Social Psychology, 39,* 590–598.

Shepherd, J. W., Ellis, H. D., McMurran, M., & Davies, G. M. (1978). Effect of character attribution on Photofit construction of a face. *European Journal of Social Psychology, 8,* 263–268.

Simon, D., Pham, L. B., Le, Q. A., & Holyoak, K, J. The emergence of coherence over the course of decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27,* 1250–1260.

Simon, D., Snow, C. J., & Read, S. J. (2004). The redux of cognitive consistency theories: Evidence judgments by constraint satisfaction. *Journal of Personality and Social Psychology, 86,* 814–837.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology* 1982 (pp. 290–312). Washington DC: American Sociological Association.

Stangor, C., & McMillan, D. (1992). Memory for expectancy-congruent and expectancy-incongruent information: A review of the social and social developmental literatures. *Psychological Bulletin, 111,* 42–61.

Stapel, D. A., Martin, L. L., & Schwarz, N. (1998). The smell of bias: What instigates correction processes in social judgments? *Personality and Social Psychology Bulletin, 24,* 797–806.

Tanaka, J. W., & Farah, M. J. (2003). The holistic representation of faces. In M. A. Peterson & G. Rhodes (Eds.), *Perception of faces, objects, and scenes* (pp. 53–71). New York: Oxford University Press.

Tredoux, C. (2002). A direct measure of facial similarity and its relation to human similarity perceptions. *Journal of Experimental Psychology: Applied, 8,* 180–193.

Trope, Y. (1986). Identification and inferential processes in dispositional attribution. *Psychological Review, 93,* 239–257.

Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgment: The role of naïve theories in corrections for perceived bias. *Journal of Personality and Social Psychology, 69,* 5–15.

Wells, G. L., & Bradfield, A. L. (1998). "Good. You identified the suspect": Feedback to eyewitnesses distorts their reports of the witnessing experience. *Journal of Applied Psychology, 83,* 360–376.

Wells, G. L., Charman, S. D., & Olson, E. A. (2005). Building face composites can harm lineup identification performance. *Journal of Experimental Psychology: Applied, 11,* 147–156.

Wells, G. L., & Hasel, L. E. (2007). Facial composite production by eyewitnesses. *Current Directions in Psychological Science, 16,* 6–10.

Wells, G. L., & Olson, E. (2002). Eyewitness identification: Information gain from incriminating and exonerating behaviors. *Journal of Experimental Psychology: Applied, 8,* 155–167.

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin, 116,* 117–142.

Wilson, T. D., Centerbar, D. B., & Brekke, N. (2002). Mental contamination and the debiasing problem. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.). *Heuristics and biases: The psychology of intuitive judgment* (pp. 185–200). New York: Cambridge University Press.

Wilson, T. D., Lisle, D. J., Kraft, D., & Wetzel, C. G. (1989). Preferences as expectation-driven inferences: Effects of affective expectations on affective experience. *Journal of Personality and Social Psychology, 56,* 519–530.

Appendix A

Case Summaries Used in Study 2

Participants read one of three case summaries. Control participants read only statements in normal text (i.e., non-italicized and non-bolded). "Strong evidence" participants read statements in normal text plus italicized statements. "Weak evidence" participants read statements in normal text plus bolded statements.

Jason West is on trial for robbery with a weapon. Please read the following description of the crime.

Michelle Stone (the victim) entered Dillard's department store at approximately 3:30 PM. She browsed leisurely as there were few customers in the store. Around 4:10 PM she brought her items to the only cashier that was open and began bagging her purchases. The cashier excused herself to retrieve a price for one of her items when a man approached Stone. The man threatened Stone with a knife and stole her credit card through the use of force. The victim sustained minor injuries during the attack, amounting to a cut on her right forearm. The only eyewitness to this attack was the victim herself. Police were called to investigate.

Jason West (the defendant), a part-time employee at Dillard's, was arrested three days later for the crime. When questioned by police officers he appeared nervous.

The crime analysis lab analyzed the victim's recovered credit card (found on the floor at the department store) for fingerprints. They found a partial print on the victim's recovered credit card. The print matched West's fingerprints. Officers searched West and recovered a knife from his pocket which was later analyzed for traces of DNA. A blood sample was lifted off of the knife and was found to be a match to the victim indicating that the victim had sustained her injuries from that particular knife. Stone was asked to make an eyewitness identification of her assailant from a police lineup. She identified West and stated that she was "90% certain" that he was the man who attacked her.

The crime analysis lab analyzed the victim's recovered credit card (found on the floor at the department store) for fingerprints. They found a partial print on the victim's recovered credit card. However, the print did not match West's fingerprints. Officers searched West but did not find a knife on him. Stone was asked to make an eyewitness identification of her assailant from a police lineup. West was placed in the lineup; however, Stone failed to identify him.

West has claimed that he is innocent throughout the trial.

Received April 24, 2008
Revision received October 29, 2008
Accepted November 3, 2008 ■