

Warning: Even Memory for Faces May be Contagious*

Elizabeth F. Loftus† and Edith Greenet†

College students (521) participated in this research program designed to study the extent to which memory for faces can be altered. Pilot results indicated that subjects who viewed a face and then heard a description of that face ostensibly written by another witness were influenced by that description. Specifically, subjects adopted the verbal expressions of another witness even when those expressions were in error. Furthermore, subjects who heard a misleading detail had a tendency to incorporate that detail into their reconstructions of the original face; subjects who did not hear the misleading detail rarely did so. These findings were further explored in three larger-scale experiments. In each of the three experiments, subjects viewed a target individual in a photograph (Experiment 2), in a film (Experiment 1), or live (Experiment 3). Subsequently, some subjects were exposed to misleading information via a version of the target individual ostensibly given by another witness (Experiments 1 and 2). The major results were as follows: (1) Experiment 1: If another witness referred to a misleading feature, over a third of the subjects included that detail in their own description, using the exact wording that the other witness had used. Control subjects rarely did so (5%). (2) Experiment 2: If the other witness referred to a misleading detail, nearly 70% of the subjects later "recognized" an individual with that feature. Control subjects did so far less often (13%). (3) If subjects were questioned with leading questions containing misinformation about a critical feature (moustache), over 30% indicated that they had seen the critical feature. Control subjects rarely did so (4%). These results show that memory for a face is affected by the introduction of subsequent misleading information about that face, contradicting the view that faces are special in their lack of susceptibility to interference. These results have important implications for police practices regarding eyewitness recognition.

INTRODUCTION

When people witness an important event such as a crime they are occasionally exposed to subsequent information that can influence the memory of that event. The influence on memory has been documented experimentally. For example, in one study

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†Department of Psychology, University of Washington.

subjects saw a film of a collision between two cars (Loftus & Palmer, 1974). Later they were asked one of two questions: "About how fast were the cars going when they hit each other?" or "About how fast were the cars going when they smashed into each other?" Subjects gave higher estimates of speed when the question contained the word *smashed* instead of *hit*. Additionally, after a one-week delay, the subjects who had been asked the question containing *smashed* showed a greater tendency to report erroneously that there had been broken glass at the accident scene. In this case the information in the question itself influenced how the subject reconstructed his or her memory of the original event. In other studies, new information presented as another witness's description, or via allowing the subject-witness to overhear a conversation, similarly caused changes in the memory for details of the initial event (Loftus, 1979).

If memory for types of objects, colors of objects, presence of objects and so on can be so easily influenced, what about memory for faces? People generally have no trouble picking out the face of a friend in a crowded room; it is a task that usually seems quite easy, relative to other sorts of recognition tasks. Using standard recognition memory designs, several investigators have reported very little forgetting of faces over reasonably long retention intervals (see Clifford & Bull, 1978, pp. 92-93, for numerous examples).

Some researchers have suggested that face recognition generally involves a special recognition system (Yin, 1969), whereas others have noted that "it is only because we have constant practice that face recognition usually seems so easy" (Glass, Holyoak, & Santa, 1979, pp. 68-69). In fact, the argument has recently been advanced that faces are special in their lack of susceptibility to interference from other faces (Davies, Shepherd, Ellis, 1979), a claim that seems to have received a bit of support from others (e.g., Carr, Deffenbacher, & Leu, Note 1, 1979). In this latter research, subjects looked at human faces for 5 seconds apiece. These subjects were actually better at discriminating targets from new distractors two weeks after the original viewing than they were two minutes afterward. Thus there appeared to be an improvement in performance rather than the decline that is typically observed with landscapes, common objects, and other materials. Although these results are only preliminary, they do suggest that something interesting may be at work when it comes to perceiving and remembering faces.

If there is something special about faces, particularly those seen in an eyewitness simulation, then it may be rather difficult to deliberately alter a witness's recognition or reconstruction of a face, despite the ease with which this can be done with other kinds of information. A pilot study was performed to explore this issue. Subjects were exposed to a set of photographs and were later given a description of one individual, a description that was ostensibly written by another witness. We were interested in how accurately a subject could then verbally describe that face and reconstruct its features from memory. This procedure was intended to simulate the situation where a witness to an event is subsequently exposed, either through conversation or reading a newspaper article, to a version given by another witness.

Two important results emerged and they were followed up in the three main experiments reported here. First, subjects showed a tendency to pick up and adopt the verbal expressions of another witness, even when the particular lexical choice referred

to an erroneous feature. We call this phenomenon "verbal contagion."¹ Second, subjects who heard a misleading detail had a tendency to incorporate that detail into their reconstructions of the original face; subjects who did not hear the misleading detail rarely did so. We first describe the pilot study, and then the three experiments inspired by it.

PILOT STUDY

Students from the University of Washington participated in this study in exchange for course credit. The study was divided into two phases: 36 subjects were shown photos of several people and reconstructed two faces with Identi-kit transparencies. Then 48 new subjects judged the similarity of these reconstructions to their target faces.

Photographs of 15 faces (5 women and 10 men) were taken from a college yearbook and were arranged on three photo sheets. One sheet showed the faces of the five women; the other two sheets each showed the faces of five men. All of the people shown in the photos were approximately the same age and were of the same race.

Face Reconstructions

In the first phase of the study, subjects were tested individually. Each subject was shown one set of five faces and was asked to examine the faces for 30 seconds. After an unrelated filler activity, the experimenter singled out one of the five faces (target face) and made sure that the subject was certain that he or she knew which face was being referred to by use of a few key descriptors (e.g., the man in the center).

The subject then received a consistent or a misleading description of the target face ostensibly compiled by a group of college professors who had had as much time as they wanted to look at the picture. The subjects listened to the professors' description under the belief that they would have to rate it on a number of attributes, such as clarity of writing. The consistent description gave a number of accurate details about the face, whereas the misleading description inaccurately described one facial feature. For example, a consistent description of the target depicted in Figure 1 contained the information that the "professors" had described the man "as being in his mid-20's. He had light colored straight hair, a dark thin moustache, and a short cropped beard. He had his chin resting on his hand and this caused the face of his silver watch to be exposed. He wore aviator glasses." The misleading description was identical except for referring to the man's "light colored curly hair."

After a subject had heard one of these descriptions, he or she was asked to write a description of the face and to reconstruct the face by using Identi-kit transparencies. The Identi-kit contains transparent line drawings of numerous alternatives of different facial features (forehead and hairline, eyes, nose, chin, mouth, facial hair, glasses, etc.). Subjects examined the features and selected those that seemed most like the ones

¹We thank Brenda Danet for first introducing us to the concept of "verbal contagion."



Fig. 1. Target face seen by subjects in pilot experiment.

of the face they were attempting to put together. When they were satisfied that a good likeness had been achieved, the composite was mounted on a white board and photographed.

This entire procedure was repeated with another sheet of faces: subjects examined five faces for 30 seconds, heard a description of the target face, wrote their own description of the face, and finally reconstructed that face with the Identi-kit. If the first description had been consistent, the subjects heard a misleading description of this second face, and vice versa.

At the conclusion of this phase, 72 subject reconstructions had been completed. Twenty-four reconstructions were available for each of three target faces: half of these were based on consistent information and half on misleading information.

Similarity Judgments

Slides were made of the three target faces so that subjects could judge the similarity between these targets and the Identi-kit reconstructions. Forty-eight subjects judged the similarity of the target faces and reconstructions in terms of four facial features. The crucial features were included among this set (e.g., the crucial feature in the example given above was hairstyle).

Subjects were tested in groups of four. Two slides were projected at all times. The target face was projected on the left and the reconstructions of that face were presented one at a time on the right. Subjects assigned a number from 1 to 5 to indicate how similar they thought each of the four features of the reconstruction was to the corresponding feature of the target face (1 = no similarity whereas 5 = high similarity). The order of presentation of the reconstructions was randomized across groups.

Results

Our first analysis concerns the extent to which the witness-subjects included the misleading detail in their written description of the face. Twenty-two percent of the written descriptions contained the misleading detail when it had been mentioned; not a single one of the descriptions contained this detail when it had not been mentioned. One subject (out of 12) claimed that the woman had glasses when she did not; three said one of the men had a dark moustache when he did not; and four said that the other target man had curly hair when his hair was straight.

Next, we determined the number of individuals who incorporated this distorted detail into their Identi-kit reconstructions of the face. Thirty-three percent of the reconstructions contained the misleading detail when it had been mentioned; only 5% contained it when it had not been mentioned.

Figure 2a contains a reconstruction of the man shown in Figure 1 made by a witness who had not been exposed to misleading information, whereas Figure 2b shows a reconstruction made by a witness who had been exposed to the misinformation of "curly hair."

And finally, we were interested in whether the reconstructions based on misleading information would be less similar to the targets as judged by an independent group of subjects. The mean judgment scores for the critical feature of each face was 2.87 for reconstructions based on misleading information and 3.24 for reconstructions based on neutral information, $t(94) = 1.47$, $.10 > t > .05$.

Two results of interest emerged from this experiment. First, subjects showed a tendency to pick up and adopt the verbal expressions of another witness. This verbal

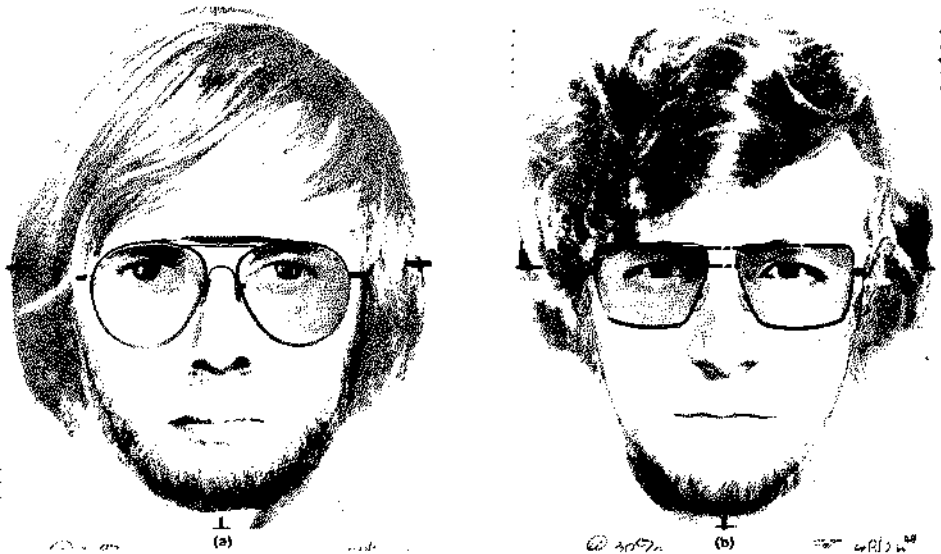


Fig. 2. (a) Subject reconstruction of target face in the absence of misleading information about curly hair. 2. (b) Subject reconstruction of target face after exposure to misleading information about curly hair.

contagion occurred with true details but more remarkably occurred with erroneous details as well. In Experiment 1 we followed up this observation and designed an experiment to assess its reliability.

A second result of the pilot study is that subjects who heard a misleading detail had a tendency to incorporate that detail into their reconstruction of the original face, whereas those who did not hear the misleading detail rarely did so. Of course, a major interpretive problem with the pilot study is that all subjects heard about the critical details, some accurately and some inaccurately. Thus, for example, the consistent subjects heard accurately about the "straight hair," whereas the misleading subjects heard inaccurately about "curly hair." This makes it impossible to know how much of the discrepancy between the consistent and misleading conditions was due to increased accuracy in the consistent conditions versus increased errors in the misleading conditions. The subsequent experiments in this paper correct for this problem. The finding that those subjects who heard a misleading detail tended to incorporate that detail into subsequent reconstruction prompted us to wonder whether giving misleading information about a person's face would similarly affect a person's ability later to recognize that face. Experiment 2 explored this question.

EXPERIMENT 1

Method

The subjects were 200 individuals who participated either for course credit or were paid \$2.50 for their time. The experimental session lasted about one hour and consisted of three major phases: subjects viewed a film clip, read and evaluated a description of that film ostensibly given by another witness, and wrote out their own description based on their memory of the film.

Subjects saw a three-minute film clip depicting an ordinary-looking man parking his car on the street in front of a small grocery store. The man entered the store, talked with a few customers, and bought two or three items. When he returned to his car he got into an argument with a young man who looked as if he were trying to break into the car. The young man ran off after yelling for a few seconds. The face of the target person was visible for approximately 10 to 12 seconds.

After the film all subjects participated in a 20-minute filler activity intended to eliminate surface memory or recency effects. Next they were given a one-page narrative containing a version of the film that was allegedly written by a professor who had seen the film. The subjects were given no information about the factualness of the "professor's description." To conceal the purpose of this task, the subjects were asked to rate the narrative on several attributes, such as clarity of writing.

Several versions of the narrative were prepared. Fifty subjects received a completely factual narrative, which included a description of the "suspect" who had run away from the car. These factual descriptions were "neutral" in the sense that they did not refer to any of the critical details that would be erroneously mentioned in other versions of the narrative. The remaining 150 subjects read a narrative that contained an erroneous description of one and only one detail pertaining to the appearance of the suspect. One-third of these read that the suspect had wavy hair (when his hair was

actually straight); one-third read that the suspect had a thin moustache (when he actually had no moustache); one-third read that the suspect had crooked teeth (when actually they were straight and could barely be seen at all).

After a second filler activity, which lasted 45 minutes and consisted of an unrelated experiment conducted by a colleague, the subjects were asked to write their own descriptions of the incident, including a description of the suspect. They were urged to be as accurate as possible and to write down only those aspects that they remembered seeing themselves. If the professor had mentioned something but they themselves had not seen it, they were told not to include it in their narrative.

Results and Discussion

The narratives were each read by two raters whose job it was to indicate whether or not the narrative included any one of three critical expressions: wavy hair, thin moustache, or crooked teeth. The raters were blind with respect to the purpose of the experiment or to the experimental condition connected to each narrative that they judged. They were to classify a narrative as containing a critical detail if and only if it used the precise wording provided.

Of those subjects whose intervening "professor's version" did not contain misleading information, only 5% used one of the critical phrases. If the "professor's version" had described a particular incorrect detail, 34% of the subjects included that detail in their own description, using the exact wording that the other "professor" witness had used, $p < .05$ by a z test.

The results indicate that subjects will pick up verbal expressions from another witness and use them to describe the contents of their own memories. This occurred in the present experiment even when the verbal descriptions were erroneous. It still remained to be seen whether the verbal misinformation influences the subject's ability to recognize a face that may or may not have been seen before. This was the rationale for conducting Experiment 2.

EXPERIMENT 2

Method

The subjects were 90 individuals who participated either for course credit or were paid \$2.50 for their time. The experimental session lasted about 1 hour and consisted of three major phases: viewing a photograph, reading and evaluating a description of the photograph ostensibly given by another witness, and then participating in a recognition test.

The subjects first saw a photograph taken from a college yearbook. It depicted a group of men and women apparently at an outdoor party. A slide of the photograph had been prepared and was projected for 5 seconds.

After viewing the slide, all subjects participated in a 20-minute filler activity intended to eliminate surface memory. Next they were given a 1-page narrative containing a version of the film that was allegedly written by a professor who had also seen the slide. The subjects received no information about the factualness of the "professor's description." The subjects read the professor's description under the

belief that their task was to rate it on several attributes, such as clarity of writing.

Two versions of the "professor's description" were prepared. In one version the narrative was completely accurate, whereas the other version was identical except that it mentioned, erroneously, that the central character in the photograph had a moustache. The factual description was "neutral" in the sense that it said nothing about a moustache at all.

After a second filler activity lasting approximately 20 minutes, the subjects participated in a recognition test. They were shown a set of 12 full-face photographs (mugshots) and asked to pick out the person who had been at the center of the original photograph (the "culprit"). Actually the culprit was not in this set of 12. Half of the persons in this set had moustaches and the other half did not.

The 12 mugshots were attached to a card which was held up in front of the subjects. The subjects looked at the mugshots for as long as they wished, and then indicated their choice on a sheet of paper by writing down the number of the mugshot that they selected. They had the option of indicating that they recognized no one. For different groups of subjects the mugshots were rotated on the card to which they were attached; this was to control for any biases that might exist to choose photographs corresponding to particular numbers.

Before leaving the experiment, the subjects were asked whether they would be willing to participate in further research. If so, they were to write their initials and phone number at the bottom of their recognition sheet. Several days later, the experimenter telephoned subjects who had received the misleading information and had chosen an individual with a moustache. Those who agreed to meet with the experimenter for the purpose of viewing additional photographs did so within one week of the original session. The new set of mugshots included the original 12 plus 6 new ones, one of which was a photograph of the original "culprit." The subjects were instructed to try hard to think about the central character in the original photograph and to recognize him now. Interest centered around the question of whether subjects would stick to their original choice or would switch their choice to the actual "culprit."

Results and Discussion

The recognition judgments of subjects who had received the misleading moustache information were quite different from those who had not. The majority of subjects who read about the moustache chose an individual with a moustache, whereas those who read a completely factual description of the original photograph rarely did so.

Of the 45 subjects who did not read about the nonexistent moustache, 6 (13%) chose mugshots with a moustache, 28 (62%) chose an individual without a moustache, while 11 (24%) declined to make a choice. For the 45 subjects who did read about the nonexistent moustache, their pattern of choices was different. Of this group, 31 (69%) chose an individual with a moustache, 10 (22%) chose an individual without a moustache and 4 (9%) declined to make a choice. The proportions choosing an individual with a moustache in these two conditions were substantially different (69% versus 13%, $p < .01$ by a z test).

Recall that, several days after the conclusion of the experiment, the experimenter

telephoned subjects who had received the misleading information and had chosen an individual with a moustache. Of the 31 subjects who fell into this category, 22 had left their telephone number, and the experimenter made contact with all but one of them. Eighteen individuals agreed to meet the experimenter for the purpose of viewing additional photographs. These subjects were shown the set of 18 photographs as the new set of mugshots described above. Sixteen subjects (89%) chose the same mugshot that they had chosen earlier, despite the fact that the true individual was now among the possible choices. One individual said he was not sure anymore, whereas the final person switched his choice to the actual "culprit."

The results of this experiment indicate that subjects will pick up verbal descriptions about an individual who has been seen before and use this information to guide their recognition judgments. If the verbal information is erroneous, it can lead to erroneous recognition. Once this has happened, the subjects tend to stick to their initial choices even when a correct choice becomes available.

EXPERIMENT 3

A legitimate question can be raised about the demand characteristics in the present experiments. In these studies, the postevent information was introduced via the use of ostensible descriptions by a group of professors who had as long as necessary to view the target person. One could argue that this "sledge hammer" produced effects that would not have occurred had the manipulations been more subtle. To satisfy this objection, a third experiment was conducted in which the postevent suggestions were introduced far more subtly.

In this experiment, subjects were 147 students who were enrolled in an undergraduate psychology course. During an ordinary class period, two men abruptly came into the classroom. One of them stood by the door while the other interrupted the class to pick up a book that he had left on a table in the front. The taller one had a brief argument with the professor and then both intruders left. About 40 minutes later, the students were given a questionnaire designed to test their memory for the incident. The questionnaire contained 15 questions, the 10th of which was critical. For each question the subject responded by checking a space for yes, no, or I don't know. One-third of the subjects received as their 10th item this question: "Was the moustache worn by the tall intruder light or dark brown? This question presupposed the existence of a moustache by definite reference of the article *the*. Actually the tall intruder had no moustache. One-third of the subjects received as their 10th item this question: "Did the intruder who was tall and had a moustache say anything to the professor?" This question presupposed the existence of a moustache via a restrictive relative clause. The remaining third of the subjects were asked a control question about the tall intruder's eyebrows.

One day later, the subjects were given an additional questionnaire that contained 10 new questions of the form "Did you see?" The ninth question asked whether or not the subjects had seen a moustache on the tall intruder.

Only 4% of the subjects in the control condition claimed to have seen a moustache on the intruder. When the moustache had been mentioned via a question containing definite reference of the article *the*, that percentage rose to 26% ($z = 3.05$,

$p < .001$). When the moustache had been mentioned via a restrictive relative clause, the percentage falsely saying "yes" was even higher, 39%! These results indicate that misinformation presented in intervening questions will similarly affect a subject-witness's tendency to misremember the facial features of a person who was seen before.

GENERAL DISCUSSION

Are faces special? On the contrary, memory for them seems to obey similar laws as memory for other sorts of information. In the present research it was shown that memory for a face is affected by the introduction of subsequent misleading information about that face, indicating that memory for faces is susceptible to what others have called "interference."

A contrary position, namely, that memory for faces is not particularly susceptible to interference effects, has recently been advanced by Davies, Shepherd, & Ellis (1979). These investigators showed subjects a videotape of three men whom they would later have to recognize. Between viewing the videotape and the recognition test, some subjects searched through 100 mugshots, determining for each face whether or not it was one of the targets. Relative to a control group that had seen no mugshots in the interval, those who had seen them performed much less well on a subsequent recognition test. An additional group of subjects who were told before the recognition test that the faces of the targets had not been among the interpolated faces, but would definitely be included in the final recognition test, performed as well as the control group. These results were interpreted as indicating that the intervening examination of mugshots produced a shift in criterion in accepting a given face as a target, rather than of interference with facial memory.

The results of the present experiment lead one to a different conclusion, namely, that postviewing activities can interfere with facial memory. A majority of the subjects who read misleading information about a face subsequently incorrectly recognized a face that contained this misleading feature. In and of itself, this finding does not bear on the criterion-shift/memory-change distinction. However, 18 of these subjects were later given a new recognition test and asked to pick out the face they had originally seen. Nearly 90% of these individuals stuck to their first selection, even though the "true" individual was contained within the set. It is difficult to see how this result could be explained in terms of a criterion shift. Rather it appears as if the post-event misleading information has been incorporated into the subject's memory and is now guiding the recognition decision. Once this detail is a part of the memory, the "true" face—which does not contain the detail—no longer matches the subject's memory.

Of course, we have not in these studies directly compared the interference effects with faces versus other objects. But it does seem safe to conclude that memory for faces is susceptible to the same postevent suggestions that have been shown so often in studies of memory for other types of details.

Our results are in accord with the recent work of Gorenstein and Ellsworth (in press). Subjects in their study saw a "criminal incident" and 25 minutes later picked out the face of the criminal from an array of 12 photographs none of which was the

true criminal. Approximately 4 to 6 days later, all subjects picked out the face of the criminal from an array of six photographs, one of which was the criminal and one was the subject's initial choice. A substantial proportion of the subjects tended to pick out the face of the person they had previously seen, rather than the face of the true criminal.

How are we to understand these instances of faulty recognition? Whenever we experience an event, albeit a scene, a face, or a complex episode, some information about that event is stored in memory. In fact, we probably store only fragments of the event because of the pressure of time or the complexity of the experience itself. After the event is over, a person is sometimes exposed to new information concerning the event. For example, the person might be exposed to the information that a key individual had a moustache. If this new information is accepted, it is introduced into the person's memory and can cause a change in the previously acquired memory. At some later time the person might be asked to recall information about the event; this recollection will be based upon the altered memory, resulting in objectively erroneous responding. The current research extends the notions of memory malleability to the important arena of facial memory.

The Gorenstein and Ellsworth (in press) result can be similarly understood in these terms. In their research, the new information consists of a series of mugshots. The subjects who accept one of these mugshots as being a photograph of the criminal essentially use it to adjust their memory. Any future attempts at recalling the true information will tap into this adjusted memory.

Experiments such as these have important implications for police practice and court procedure. Since witnesses will easily pick up the verbal expressions used by others, investigators should take care not to put words into the mouths of witnesses. In one recent unreported case a witness described her assailant as having a thin moustache. An investigator later remarked: "You said it was a pencil-thin moustache, didn't you?" From that time forward, the witness described the moustache as being pencil-thin. An awareness of the phenomenon of verbal contagion can perhaps aid us in avoiding its nasty consequences in the future.

The verbal expressions and other postevent information to which a witness is exposed will not only appear in the verbal reports of witnesses but will also influence future recognition of persons who have been seen before. Facial memory is not special, at least in this regard. A partial understanding of this problem has led to the common police practice of having multiple witnesses to a crime view photographs or lineups separately, a procedure that is to be applauded but is occasionally violated (Wall, 1965). This practice eliminates the problem of witnesses either verbally or non-verbally, intentionally or unintentionally, communicating with one another.

Verbal suggestions from outside sources are adopted by witnesses, and these in turn influence subsequent recognition. This finding relates to an interesting body of past research and has further implications for police practices. A classic study by Carmichael, Hogan, & Walter (1932) showed that a systematic distortion in memory for a visual object could be produced by associating that object with a particular label. An ambiguous object, for example, two circles joined from their near points by a straight line, could be described either as "glasses" or as a "dumbbell." When described as glasses, people typically remembered the figure as having a curved line, the nosepiece, connecting the circles. On the other hand, when the object was described as a

dumbbell, the connecting lines were typically doubled in memory. A good deal of the research on the impact of labeling on memory has been reviewed by Riley (1962). This research suggests that the verbal labels associated by a witness to a criminal may affect the witness's memory for that criminal. When a lineup is arranged this fact needs to be taken into account. Many police investigators are instructed to arrange lineups solely with the aim of choosing persons who are as far as possible of the same age, height, and general appearance as the suspect. However, lineups should also be based upon a witness's verbal description (Clifford & Bull, 1979; Doob & Kirshenbaum, 1973). Participants should match, as much as is possible, any characteristic that was verbalized by a witness. The chances of the witness choosing the suspect simply because he or she best matches the verbal description are then minimized. In practice, then, the formation of a lineup should be based on a compromise between the matchup of the individual suspect to the verbal description given by the witness and the need to select distractors who match the physical characteristics of the suspect.

REFERENCE NOTE

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