



## When Reality Monitoring Fails: The Role of Imagination in Stereotype Maintenance

Morgan P. Slusher and Craig A. Anderson  
Rice University

Research on reality monitoring (the process by which people distinguish memories of real events from memories of imagined events) suggests that the occurrence of imagined events can inflate the perceived frequency of corresponding real events. When the availability of real events is assessed, reality monitoring apparently fails to exclude some events that were only imagined. We conducted two experiments to examine how such failures in reality monitoring can contribute to the maintenance of social stereotypes. When subjects imagined members of occupational groups in the initial experiment, they tended to incorporate stereotyped traits into their imaginations, with specific traits determined by the contexts being imagined. This result suggests that imagined events do correspond with stereotype-confirming real events. In the second experiment, subjects read sentences that presented traits (stereotyped and nonstereotyped) in association with occupations with uniform frequency. They also imagined members of each occupation in situations relevant to particular stereotypic traits, but without presentation of the traits. In subsequent judgments of presentation frequency, subjects overestimated their exposure to stereotypic occupation-trait combinations, which replicated earlier studies. More important, subjects further overestimated the presentation frequency of *imagined* stereotypic combinations, which indicated the failure of subjects to distinguish their self-generated images from actual presentations. These results confirmed that stereotype-based imaginings can lead to inflated association of groups with their stereotypic traits. Such *imaginal confirmation* of social stereotypes may contribute to the self-perpetuating nature of these beliefs.

A stereotype represents a set of beliefs about the personal attributes of a social group (Ashmore & Del Boca, 1981). These beliefs help people organize their social environment, but such beliefs reflect judgmental error when they inaccurately represent reality. Although some traditional views of stereotypes posit that they result from emotional intrusions, recent researchers have increasingly recognized that the maintenance of social stereotypes can result from important perception and memory processes (Hamilton, 1979, 1981a; Nisbett & Ross, 1980; cf. Allport, 1958). In studying the intransigent nature of stereotypes, investigators have looked at biased interpretation of ambiguous events (Duncan, 1976), selective memory of events (Hastie & Kumar, 1979; Rothbart, Evans, & Fulero, 1979), reconstructive memory of events (Bellezza & Bower, 1981; Clark & Woll, 1981; Snyder & Uranowitz, 1978), and illusory correlations based on prior associations (Hamilton &

Rose, 1980). The cognitive processes that maintain stereotypes are those that tend to inflate the perceived frequency with which stereotypic attributes are associated with group membership. This article introduces and presents evidence for an additional cognitive process that may contribute to stereotype maintenance.

Imagined events can inflate frequency estimates of corresponding real events (Johnson & Raye, 1981). This phenomenon, coupled with evidence that covariation judgments are inordinately influenced by confirming cases (e.g., Smedslund, 1963), suggests that stereotypes may be maintained by confirming events that exist in the mind of the stereotype holder rather than in external reality. We call this process *imaginal confirmation* of social stereotypes.

### Frequency Estimation

As events occur over time, people automatically store pieces of information that allow them to judge the frequency of similar events (Alba, Chromiak, Hasher, & Attig, 1980; Hasher & Chromiak, 1977; Hasher & Zacks, 1984). Although a number of theories have been proposed to account for this ability to judge frequency (Howell, 1973), the multiple-trace theory (Hintzman & Block, 1971) has gained wide acceptance. This theory suggests that each occurrence of an event produces a

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Correspondence concerning this article should be addressed to either Morgan P. Slusher or Craig A. Anderson, Department of Psychology, Rice University, P.O. Box 1892, Houston, Texas 77251.

different memory trace. The traces coexist in memory, distinguished by the contexts in which they were stored. Although frequency judgments may be derived by counting traces in very simple situations, it seems likely that the availability of traces is assessed in making most such judgments (Howell & Burnett, 1978; Tversky & Kahneman, 1973). Because availability is influenced by factors other than actual event frequency, serious judgmental errors often occur.

### Illusory Correlation

Frequency judgments (and errors in such judgments) contribute to the maintenance of stereotypes through the formation of *illusory correlations* (Chapman, 1967; see also Hamilton, 1981b, for a review). The statement "men are domineering" reflects a perceived correlation between the variables of sex and dominance and indicates an implicit belief that women are not domineering. The truth of the statement can be tested only with knowledge of the frequency of domineering men and women and of submissive men and women in the population. Research on covariation judgment (reviewed by Crocker, 1981) suggests that people cannot accurately judge such frequencies or use the information to test their stereotypic beliefs. In judging such relations, people often give inordinate weight to the absolute frequency of confirming cases. This, in turn, gives each confirming case an inappropriate importance in the overall judgment. The result is often an illusory perception of more correlation between variables than actually exists in the data.

Frequency judgments may also be inflated by prior associations incorporated into an event. This may occur for word pairs, such as *knife-fork* (Chapman, 1967), or for stereotypes, which are associations between social groups and personal characteristics (Hamilton & Rose, 1980). To test whether stereotype-confirming information is perceived to occur more frequently than other information, Hamilton and Rose presented sentences consisting of a name, an occupation, and two trait-descriptive adjectives (e.g., "Doug, an accountant, is timid and thoughtful"). Subjects judged how often traits occurred with each occupation. Despite equal exposure to stereotypic and neutral traits, subjects overestimated the frequency of stereotypic descriptions and formed illusory correlations confirming their stereotypes. Because an occupation and its stereotypic trait are strongly associated, together they are highly available in memory and their co-occurrence is judged more frequent than the co-occurrence of the occupation with a neutral trait.

We propose, however, that stereotype maintenance results not only from misperception of real covariation data but also from misperception of one's own stereotype-biased imaginings. Before presenting our theory in detail, a quick review of how imagined events are confused with real events is presented.

### Reality Monitoring

An accurate judgment of event frequency clearly requires that relevant events be distinguishable from other events. When there is difficulty distinguishing two classes of events, frequency judgments for one class may be influenced by instances of the second class. Such seems to be the case in a study by Johnson,

Taylor, and Raye (1977) in which the two classes of events were externally generated words (words that were viewed) and internally generated words (words that were thought about). Frequency judgments for events in each class were influenced by the frequency of events in the other class.

The general process by which a person attributes a memory to an external or an internal source has been referred to as *reality monitoring* (Johnson, 1977; Johnson & Raye, 1981). Johnson and Raye (1981) proposed that perceived events differ from self-generated events along several general dimensions independent of the content of the memory. These dimensions include amount of contextual information (time and place), semantic detail, sensory information, and cognitive operations. People capitalize on differences in these dimensions to distinguish memories of real and imagined events. An important finding of the empirical studies cited in support of this model is that confusion between the two types of events often exists. The reality-monitoring process is not always successful.

In several studies (Johnson et al., 1977; Raye, Johnson, & Taylor, 1980), frequency judgments of external events were compared with frequency judgments of self-generated events. These studies involved two kinds of cued-response trials, presentation and generation. Both cues and responses were provided by the experimenter in the presentation trials. Cues alone were provided on the generation trials and subjects were to generate the appropriate response (e.g., the stimulus *Color-BLUE* was presented on presentation trials, but on generation trials only the word *Color* was given, and subjects were to recall and generate the response "BLUE"). Items were presented in both kinds of trials multiple times, followed by an unexpected frequency-judgment task. Some subjects estimated the number of times they actually saw an item (e.g., the written word *BLUE*), whereas other subjects estimated the frequency with which they generated the items. A major outcome of these studies concerned confusion between the two types of events. Generating events systematically increased the estimates of presentation frequency. The reverse was also true but to a lesser degree (Raye et al., 1980).

Johnson, Raye, Wang, and Taylor (1979) examined the effects of visual imagination on frequency judgments of real visual events. Words were placed among a series of pictures. Each word indicated that subjects were to imagine a corresponding picture. Subjects then estimated how often they had actually viewed each picture. A standard test of visual imagery classified subjects as good or poor imagers. Results showed that frequently imagined pictures were thought to have been viewed more frequently. The effect was stronger for good than for poor imagers. Presumably, a good imager generates an image closer in sensory detail to the actual picture and is less able to distinguish the generated image from the actual picture.

How might failures in reality monitoring affect stereotype maintenance? The perceived frequency of stereotype-confirming cases may be inflated by the confusion of imagined events with real events. This possibility is explored in our theory of imaginal confirmation.

### Imaginal Confirmation

When people imagine a picture, they come to believe that they have actually seen that picture more often. We suggest that

when people imagine other people, particularly those who belong to an identifiable social group, they incorporate their stereotypes into their imaginations. As a result, people may come to believe that they have seen this "picture" more often (i.e., the picture of an individual fitting their own stereotype). If this occurs, people are providing their own *imaginal confirmation* of their previously established stereotypes.

We all spend a great deal of time focused on private, internal events. Although such thoughts often are recollections of past events, they also include planning and anticipation for possible future events that include other people. We might ask ourselves what we would do if we were mugged by a stranger, or how we might be treated if stopped for speeding by a police officer. Our imagination also is triggered by events presented in the media (e.g., television, radio, newspapers), in books, and in other information sources, as well as by the more spontaneous imagination processes of daydreaming and ruminating. Thus, there is ample opportunity for our imaginations to influence our intentions (Anderson, 1983b), our affects (e.g., Rosenhan, Salovey, & Hargis, 1981; Thompson, Cowan, & Rosenhan, 1980), and even our behaviors (Gregory, Cialdini, & Carpenter, 1982; Sherman & Anderson, in press). Our beliefs about social groups also appear to be susceptible to imagination effects.

As suggested by earlier examples, a target person in an imagined scene often is known only by membership in some social group (e.g., criminal, police officer, etc.). We believe that the imagined characteristics of the target person, if not previously specified, will be determined by an interaction between the stereotypes held by the imaginer and the context of the imagined scene. Suppose that a person's stereotype of black people includes "black people are athletic" and "black people are criminals." If that person is anticipating attendance at a basketball game that evening, he is likely to imagine black basketball players displaying their talents in the context of the game. However, in the context of walking to the car through a dimly lit parking lot after the game, this same person may imagine a black person engaged in criminal activity.

People do not always remember such imaginations as distinct from observations of external events. Reality monitoring sometimes fails. When this happens, inflated frequency estimates create illusory correlations between social groups and their stereotypic attributes. Judgments of covariation often are influenced to an inappropriate degree by the perceived frequency of confirming events, and stereotypic imaginations essentially become confirming events generated on the basis of the stereotype itself. In this way the stereotype is self-perpetuated through imaginal confirmation.

We have carried out a program of research to investigate the imaginal confirmation of stereotypes within a laboratory setting. The overall plan of this research was to build systematic evidence that (a) stereotypes determine the traits of imagined target persons in the context of selected imagined situations and (b) the imagination of individuals with stereotypic traits inflates the perceived frequency with which the traits are associated with a group. For each of three occupations, two stereotypic traits were selected for study. We devised situations potentially related to one or the other of the two traits for each occupation. These would provide contexts in which target persons could be

imagined. In Experiment 1, we asked subjects to imagine members of each occupational group in each of these situations and to record what they imagined. This was done for two reasons: (a) to verify that it is the combined influence of stereotype and context that determines the attributes of an imagined target person and (b) to document responses to these stimulus materials in preparation for the second experiment. In Experiment 2, subjects were presented with presentation trials and generation (imagination) trials in a paradigm much like that of Johnson et al. (1977). In this case, the presentation trials were in the form of sentences linking occupational groups (the cue) with their stereotypic traits (the specified response). Generation trials cued subjects to imagine target persons from the occupational groups, but they did not specify any trait. Instead, subjects were induced to generate specific traits by the context in which they imagined the target person (on the basis of the results of Experiment 1, from which we inferred what was stereotypically imagined in response to certain occupation/situation combinations). After a series of presentation and generation trials, subjects were asked to judge the frequency with which traits had been presented in association with each occupation. Our hypothesis was that this frequency estimate would be inflated for those traits that had been imagined in the generation trials. Because the responses to the generation-trial cues were based on stereotypes in the first place, such inflated frequency estimates would represent apparent confirmation of the stereotypes based on the stereotypes themselves.

## Experiment 1

### Overview

The first experiment served two purposes. First, it was designed to demonstrate that people do indeed imagine other people according to their stereotypes. Because our eventual aim was to examine whether imagined stereotype-confirming events influence the assessment of stereotypes, we first had to show that such imagined events exist. The second purpose was to assure the validity of the stimulus materials designed for use in Experiment 2. Subjects read sentences that placed target persons in a variety of situations, imagined the behavior of these persons, and wrote out what they imagined. Each target person was described as a member of a particular occupational group (lawyer, artist, or clergyman). Each situation was designed to cue a specific descriptive trait (aggressive, wealthy, temperamental, creative, kind, or friendly) and was presented in conjunction with a member of each occupation. Each of these traits was stereotypic of one of these three occupations. The situations cued these traits only in the sense that they provided a context in which certain traits might reasonably be expected to manifest themselves. We expected that the subjects themselves would infer the presence of these stereotypic traits on the basis of occupational group and would incorporate these traits into the target persons' behaviors when the context made this possible. Therefore, we predicted that subjects would imagine target persons as possessing the specific traits of interest when (a) the trait was stereotypic of the occupation of the target person and (b) the situation provided a context in which the trait was rele-

vant. By examining the written descriptions of what the subjects imagined, we could determine whether subjects did indeed infer these traits under these circumstances.

### Method

**Subjects.** Seven male and 3 female undergraduate students at Rice University participated as subjects in this study and received course credit. In addition, three raters evaluated the written passages. Two raters were psychology graduate students and the third was an alumnus of the undergraduate psychology program.

**Stimulus materials.** Traits and occupations used in this study were selected on the basis of a survey of our target population (Rice University students). Participants were given an occupation title and a list of traits and were asked to indicate on a 7-point scale how characteristic each trait was of people in the specified occupation ( $-3 = \text{very uncharacteristic of this group}$ ,  $0 = \text{not particularly relevant to my perception of this group}$ ,  $3 = \text{very characteristic of this group}$ ). We classified traits as *stereotypic* if their mean ratings were greater than or equal to 2 and differed significantly ( $p < .01$ ) from 0. Neutral traits had mean ratings that did not differ significantly from 0 ( $p > .01$ ). We required three occupations and six traits, with each occupation characterized by two traits that were neutral with respect to the other two occupations. The following trait-occupation pairs were selected as stereotypic: aggressive lawyer, wealthy lawyer; temperamental artist, creative artist; and kind clergyman, friendly clergyman. (A complete description of the trait-selection process is available from the authors.)

The stimulus materials for Experiment 1 consisted of 36 sentences, 12 situations matched with members of the three occupational groups (lawyers, artists, and clergymen). For example, one sentence was, "George, a lawyer, is shopping for a car." Other sentences paired the situation "shopping for a car" with *artist* and *clergyman* (with different names in each sentence). Each situation was designed to provide a context for imagining one of the six traits (aggressive, wealthy, temperamental, creative, kind, or friendly). For example, the activity "shopping for a car" differs depending on the financial well-being of the shopper. A wealthy person shops for a fancy car, whereas a poor person shops for basic transportation. Hence, a target person stereotyped as *wealthy* is expected to display that trait in the imagination of this situation. Two such situations cued each trait. The complete set of 12 situations is provided in the Appendix.

**Procedure.** The study was run in sessions with 1 to 5 subjects per session. Subjects were given a booklet that contained the experimental instructions on the front page and a single sentence on each of the 36 pages that followed. The instructions informed subjects that each sentence "describes a person in a certain scene or situation." Subjects were to "take several seconds and imagine the scene" and were to "feel free to elaborate and add details that you feel are appropriate." They were then instructed to write a detailed description of what they imagined before proceeding at their own pace. Upon completion of all sentences, subjects received a complete debriefing on the purpose of this study.

Expert raters evaluated the subjects' written passages to detect the six traits of interest. Raters were "expert" in the sense that they discussed general aspects of each relevant trait prior to offering their independent judgments. For example, raters agreed that if the situation "shopping for a car" produced a response that included shopping for an expensive car (such as a Mercedes), the trait *wealthy* was being represented. Before the passages were rated, the experimenter used a black marker to blank out the words in the original sentences that indicated the occupation of the characters and references to specific occupations in the written passages. This minimized any effect the raters' stereotypes may have had on their judgments.

### Results and Discussion

Three raters assessed every passage that subjects wrote and identified which, if any, of the six traits were present. Majority opinion defined the presence or absence of a trait. There was unanimous agreement among the raters on 95% of the ratings.

In keeping with the dual purposes of this experiment, the analysis was focused in two directions. The first purpose was to demonstrate that people do indeed imagine other people according to their stereotypes and that our imagination sentences cued the stereotypic traits we intended to cue. Because each situation was presented in conjunction with each occupational group, a planned comparison determined whether the cued trait was imagined more frequently with the occupation for which it was stereotyped than with the other two occupations. For example, for the two situations designed to cue *wealthy*, weights of 2,  $-1$ , and  $-1$  were assigned to the frequencies with which wealthy lawyers (the stereotyped combination), wealthy artists, and wealthy clergymen were imagined, respectively. If the trait *wealthy* was cued by the situation (rather than by the situation-occupation pairing), this linear combination would not be expected to differ from zero. If, on the other hand, subjects incorporated occupational stereotypes into their imaginations, and the situations merely provided a context in which to do so, this linear combination should yield a positive value.

For every one of the 12 situations, the appropriate weighted comparison yielded a positive value. This stereotype-intrusion effect was quite strong, as shown by the magnitude of the planned comparison scores ( $M = 6.33$ ) and their statistical reliability,  $t(11) = 7.82$ ,  $p < .0001$ . Thus, subjects' stereotypes did influence what they imagined in these situations.<sup>1</sup>

The second purpose of this experiment was to examine the validity of stimulus materials designed for use in Experiment 2. As discussed briefly in the introduction, the second experiment involved *presentation* trials in which subjects were shown sentences specifically linking traits with occupations and *generation* trials in which subjects were expected to imagine certain traits in response to their own stereotypes and the contexts that we provided. The sentences used in Experiment 1 were designed to be the cues for the generation trials in Experiment 2. Two stereotypic traits were selected for each occupation so that some subjects could be cued to imagine one trait while other subjects were cued to imagine the other. This would provide an appropriate means for comparison. In fact, Experiment 2 involved two conditions: one in which subjects were cued to imagine the traits *aggressive*, *temperamental*, and *kind* for the occupations lawyer, artist, and clergyman, respectively, and one in which subjects were cued for *wealthy*, *creative*, and *friendly* for these same occupations. Therefore, the six situations that cued *aggressive*, *temperamental*, and *kind*, when linked with the three occupations, formed the 18 sentences (called Group ATK) for generation trials in one condition. The six situations cuing *wealthy*, *creative*, and *friendly* entered into the 18 sentences (labeled Group WCF) that would be used for the other condition.

<sup>1</sup> Note that stimulus sentences rather than subjects were used as the random variable in this analysis. The subsequent analysis treats subjects as the random variable.

Table 1  
*Mean Frequency of Trait Generation as a Function of Contextual Cuing and Stereotypic Association*

Relation to target occupation	Context	
	Cued	Not cued
Stereotyped	1.3	0.1
Not stereotyped	0.4	0.0

What the analysis of Experiment 1 revealed was subjects' responses to these two groups of sentences.

This group-level analysis was necessary because of the limited control an experimenter can exert on a subject's imagination. For example, the situation "shopping for a car" cued the trait *wealthy* for lawyers more than for artists or clergymen. However, a subject may also use this context to imagine a creative artist (e.g., one who is shopping for just the right car to paint in a creative design). The challenge to the experimenter is to take advantage of this possibility in order to strengthen the experimental manipulation, rather than dilute it. If subjects are shown the Group WCF sentences, six of these sentences refer to artists, and so there are six opportunities to imagine creative (or temperamental) artists. What is important in Experiment 2 is that subjects shown WCF sentences actually imagine creative artists rather than temperamental artists in response to any of these sentences, not just the two designed to cue creative artists. The data of Experiment 1 allowed us to look at these sentences as groups to determine if this was the case for the trait combinations specified earlier.

In Experiment 1, each subject saw the 18 sentences from each of the two groups, and within each group there were 6 sentences for each of the three occupations. Therefore, each subject could have generated each trait as many as 6 times for each occupation (even though only two situations were intended to be relevant to each trait) in response to sentences in each group. Table 1 shows the mean number of times traits were generated in connection with occupations, depending on whether they were cued or not cued by a group of sentences. Cued traits for Group ATK sentences were *aggressive*, *temperamental*, and *kind*. These same traits were not cued by Group WCF sentences. *Wealthy*, *creative*, and *friendly* were cued by Group WCF sentences and not cued by Group ATK sentences. Within each group, these traits were stereotyped for lawyers, artists, and clergymen, respectively, and not stereotyped in combination with other occupations.

From Table 1, we first can examine whether stereotyped traits were generated more frequently than nonstereotyped traits. The main effect of stereotyping was very highly significant,  $F(1, 9) = 33.41, p < .0003$ . Individual comparisons (stereotyped vs. nonstereotyped traits for a given occupation and stereotyped vs. nonstereotyped combinations for a given trait) all showed differences in the predicted direction, although not all such differences were significant. This confirms that stereotypes are incorporated into the imaginations people generate with regard to members of groups. Note that unlike the earlier analysis, this comparison includes stereotyped responses to any of the stimu-

lus situations, not just to those originally designed to cue a particular trait.

The second issue of importance in these data concerns the generation of traits differentially in response to the two groups of sentences. The means in Table 1 show that the sentences did cue the expected stereotyped traits, as indicated by a significantly higher mean generation frequency in the cued stereotyped cell than in the remaining cells,  $F(1, 9) = 40.57, p < .0001$ . Thus, the generation of a trait depended both on stereotyping and the provision of an appropriate context. Among the stereotyped pairs, aggressive lawyer, temperamental artist, and kind clergyman were generated significantly more than wealthy lawyer, creative artist, and friendly clergyman in response to Group ATK sentences,  $F(1, 9) = 20.52, p < .002$ . Likewise, wealthy lawyer, creative artist, and friendly clergyman were generated significantly more than aggressive lawyer, temperamental artist, and kind clergyman in response to Group WCF sentences,  $F(1, 9) = 52.42, p < .0001$ . Also, the generation of individual stereotyped occupation-trait pairs differed in response to the two sentence groups (with mean frequencies of generation differing at a significance level of  $p < .05$  in all cases). Aggressive lawyer, temperamental artist, and kind clergyman were all generated more in response to Group ATK sentences ( $M_s = 0.8, 0.8, \text{ and } 1.6$ , respectively) than in response to Group WCF sentences ( $M_s = 0.0, 0.0, \text{ and } 0.3$ , respectively). Wealthy lawyer, creative artist, and friendly clergyman were all generated more in response to Group WCF sentences ( $M_s = 1.4, 1.1, \text{ and } 1.9$ , respectively) than in response to Group ATK sentences ( $M_s = 0.1, 0.1, \text{ and } 0.1$ , respectively).

In summary, the results of this experiment support a key element in the process of imaginal confirmation, that people tend to imagine members of groups in accordance with their stereotypes for that group. It has also been confirmed that stimulus materials used in this study effectively cue subjects to generate stereotyped occupation-trait pairs in a predictable fashion.

## Experiment 2

### Overview

In introducing this program of research, we suggested that people tend to imagine members of a group according to their stereotypes of the group and later confuse these self-generated events with events in external reality. This would result in an inflated estimate of the frequency with which a stereotyped trait is associated with the group and would therefore tend to support and maintain the stereotype. Experiment 1 confirmed that people do tend to incorporate their stereotypes when imagining situations in which particular stereotypic traits are relevant. Experiment 2 examined the effect that these imaginations have on the perceived frequency of stereotype-confirming events. Subjects were exposed to events that confirmed their stereotypes (presentation trials in the paradigm of Johnson et al., 1977) mixed among events that were irrelevant to these stereotypes (provided as distracters). They were also allowed to generate events within their imaginations and incorporate their stereotypes into these events (generation trials). Frequency estimates were taken to determine whether the self-generated events inflated the perceived exposure to stereotype-confirming events.

Two hypotheses were tested in this experiment. First, we expected frequency estimates to be higher for stereotypic traits than for nonstereotypic traits (a replication of findings by Hamilton & Rose, 1980). Second, we expected frequency estimates to be higher for those stereotyped traits that were cued to be imagined than for those stereotyped traits that were not. It is the second hypothesis, based on the findings of Johnson and Raye (1981), that embodies the predicted effect of imaginal confirmation. A corollary to the second hypothesis was that nonstereotyped traits would be unaffected by the generation of imagined events, because the imagined events would not incorporate nonstereotypic traits.

### Method

**Subjects.** Twenty-six undergraduates (13 male and 13 female) at Rice University participated in this experiment in group sessions ranging in size from 6 to 11 people. They received credit toward a course requirement. Each subject was randomly assigned to one of the two experimental conditions.

**Procedure.** Upon arrival at the laboratory, subjects were told that they were participating in a "study of imagery" and were administered the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973), a test of visual imaging ability. This short questionnaire suggests a number of scenes the subject is supposed to imagine and provides a scale for the subject to describe the vividness of the imagination of each. Lower numbers on the scale denote more vivid images. Information from this test allowed us to examine whether imaginal confirmation is dependent on visual imagination.

Each subject was randomly assigned to one of two conditions, referred to here as the ATK condition and the WCF condition. The labels of the conditions refer to the generation sentences presented to each subject in the condition. Those in the ATK condition were presented the Group ATK sentences, which were shown in Experiment 1 to cue generation of the traits *aggressive*, *temperamental*, and *kind* in association with the occupations *lawyer*, *artist*, and *clergyman*, respectively. Subjects in the WCF condition viewed the Group WCF sentences, which cued, in Experiment 1, generation of the traits *wealthy*, *creative*, and *friendly* in association with these same occupations.

After all subjects had completed the VVIQ, booklets were distributed to subjects in accordance with their assigned condition. The booklets were 54 pages long, and each page contained a single sentence describing a member of an occupational group in some situation. In some sentences, a trait-descriptive adjective described the individual, and the situations emphasized that particular trait. These 36 sentences paired each of the six traits (*aggressive*, *wealthy*, *temperamental*, *creative*, *kind*, and *friendly*) with each of the three occupations (*lawyer*, *artist*, and *clergyman*) exactly twice, so zero correlation existed between traits and occupations. This yielded stereotype-confirming sentences (e.g., "Arthur, a wealthy lawyer, is taking a swim in his back yard pool") and stereotype-irrelevant sentences (e.g., "Ben, a creative lawyer, enjoys making pottery as a hobby"). In addition, booklets for the ATK condition contained the sentences of Group ATK (e.g., "Frank, a lawyer, is trying to reach the check-out counter in a crowded department store") and the booklets for the WCF condition contained the sentences of Group WCF (e.g., "John, a lawyer, is standing in front of his home"). These sentences did not include trait-descriptive adjectives but, instead, provided situations in which a particular trait could be imagined. In the last example mentioned, financial standing can affect the kind of home imagined, so the trait *wealthy* is relevant. However, the situation "standing in front of his home" does not itself confirm wealth because many nonwealthy people own modest homes. Each such situation was paired equally often

with each occupation. The ordering of all of the sentences in each booklet was random; seven different orderings were used in each condition.

Subjects were instructed to "read each sentence in the booklet carefully and try to imagine the scene or situation depicted." They were warned that they would "be asked to recall information about the material," but no specific mention was made of recall for frequencies. Subjects proceeded through the booklets at a pace of 15 s per page.

Next, subjects were given a 4-page booklet that assessed occupation-trait frequency judgments. The first page contained instructions, including a reminder that in some of the sentences they had just read, "a trait-descriptive adjective described the central character." To make certain that subjects understood what was meant by a trait-descriptive adjective, the example, "George, a witty barber, is telling a joke to a customer," was presented, and the word *witty* was identified as the trait-descriptive adjective. These instructions then followed the example:

Of the 54 sentences you read, two thirds of them contained a trait-descriptive adjective. Listed on the following pages are some of the adjectives used in the person descriptions. On these pages, please indicate how many times each of these adjectives described each occupational group in the sentences you read. Do so by placing a number in the blank next to every adjective, indicating the number of times that adjective described members of the occupation listed at the top of the page. If a given trait was not paired with a given occupation, indicate this with a zero. Be sure to enter a number by every adjective.

These instructions were patterned after those of Hamilton and Rose (1980).

On each of the remaining three pages, an occupation was written, and the six traits were listed with blanks beside them. The ordering of occupations was varied, but traits were always listed in alphabetical order. After they completed the frequency-judgment task, subjects were debriefed with a written explanation of the purpose of this study.

### Results and Discussion

Frequency judgment is the sole dependent variable. In both conditions, the objectively accurate frequency of every trait under every occupation was exactly 2. The information of interest is, of course, the way in which frequency judgments were biased by both the stereotypic relation between certain of the occupation-trait pairs and the inclusion of sentences known to cue imagination of stereotyped traits. The mean frequency judgments are given in Table 2.

The overall mean frequency judgment ( $M = 2.026$ ) was not significantly different from the correct value of 2. Perhaps this overall accuracy was demonstrated because the instructions provided an indirect indication of the total number of adjectives in the stimulus set.

This experiment incorporated a mixed factorial design. Ignoring ordering differences (which counterbalanced stimulus materials), the single between-subjects factor was condition, which had two levels (ATK and WCF). Within each condition, there were three levels of occupation (*lawyer*, *artist*, and *clergyman*). Traits describing each occupation could be categorized along two dimensions. Each trait was either stereotyped or not stereotyped for a given occupation, and it was either cued or not cued to be imagined. Thus, the experiment could be summarized as a 3 (occupation)  $\times$  2 (condition)  $\times$  2 (stereotyping)  $\times$  2 (cuing) design.

We did not predict different patterns of results for the dif-

Table 2  
Mean Estimates of Presentation Frequency for Occupation-Trait Pairs as a Function of Imagination Condition

Trait	Condition	Occupation		
		Lawyer	Artist	Clergyman
Aggressive	ATK	3.23	2.15	2.46
	WCF	2.92	1.85	1.54
Wealthy	ATK	2.15	1.92	1.77
	WCF	2.54	1.08	1.23
Temperamental	ATK	2.23	2.54	1.69
	WCF	1.92	2.00	1.38
Creative	ATK	2.15	2.46	2.15
	WCF	1.31	2.77	1.38
Kind	ATK	1.62	2.23	2.23
	WCF	1.38	1.46	2.08
Friendly	ATK	2.08	2.15	2.46
	WCF	2.00	1.69	2.69

Note. Actual presentation frequency in all cells was exactly 2. Subjects in the ATK condition experienced generation trials to cue *aggressive*, *temperamental*, and *kind*, whereas subjects in the WCF condition were cued to generate *wealthy*, *creative*, and *friendly*.

ferent occupations. Indeed, the results did not differ by occupation for stereotyped traits ( $F = 0.12$ ) or for nonstereotyped traits ( $F = 0.05$ ). The data were therefore collapsed across occupations.

The between-subjects condition factor was included in this experiment to counterbalance the design so that traits cued for generation in one condition would be uncued in the other condition and vice versa. However, we expected the same pattern of results for each condition. In fact, the ATK and WCF conditions may be considered to be independent replications of the experiment. To appropriately collapse across these conditions, the three-way Stereotyping  $\times$  Cuing  $\times$  Condition interaction must be nonsignificant, as it was ( $F = 0.30$ ). This indicated that the Stereotyping  $\times$  Cuing interaction (which is important for the major hypothesis of this study) did not differ for the two conditions. Therefore, data from the two conditions were combined. The results are plotted in Figure 1.

The major hypothesis with its corollary predicts a Stereotyping (stereotyped vs. nonstereotyped)  $\times$  Cuing (imagination: cued or not cued) interaction. This interaction was significant,  $F(1, 25) = 4.84$ ,  $p < .04$ , which indicates that the effect of cuing (and hence, imagination) differed for stereotyped and nonstereotyped traits. Furthermore, planned comparisons confirmed that the pattern of means in Figure 1 conforms to the predicted pattern. The simple main effect of stereotyping was significant for uncued traits,  $F(1, 25) = 8.07$ ,  $p < .01$  (for nonstereotypic traits,  $M = 1.81$ , and for stereotypic traits,  $M = 2.35$ ). Stereotypic traits were judged to be more frequent than nonstereotypic traits, even in the absence of generation trials. This directly replicates the results of Hamilton and Rose (1980) and confirms the first hypothesis.

The second hypothesis was confirmed by the significantly greater frequency estimates for cued stereotyped traits ( $M =$

2.67) than for uncued stereotyped traits ( $M = 2.35$ ),  $F(1, 25) = 4.75$ ,  $p < .04$ , coupled with the insignificant effect of cuing for nonstereotyped traits (for traits not cued,  $M = 1.81$ , and for cued traits,  $M = 1.76$ ,  $F = .09$ ). This is exactly the pattern predicted to result from imaginal confirmation.

One interesting aspect of the analysis surrounding Figure 1 is that both stereotyping and cuing are within-subjects factors. This means that a plot similar to Figure 1 could be drawn for each individual subject, and the pattern of means could be examined to see how strong the imaginal-confirmation effect is for that subject. A single number that measures the strength of the imaginal-confirmation effect is the linear combination of means with weights of 1 for the cued stereotyped and the uncued nonstereotyped means and  $-1$  for the other two means (i.e., the contrast pattern for the Stereotyping  $\times$  Cuing interaction). If the imaginal-confirmation process is visual in nature, the predicted pattern should be stronger for subjects with greater imaging ability as measured by the VVIQ. However, the effect did not correlate significantly with imaging ability ( $r = .16$  between the effect measure and VVIQ score). In fact, because higher scores on the VVIQ represent poorer imaging ability, the correlation was in the wrong direction. This result implies that imaginal confirmation is not dependent on visual-imaging processes. Alternatively, our small sample size as well as possible range restrictions and unreliability problems with the VVIQ could have precluded a strong effect. Our finding thus suggests that visual imagery is not involved, but it does not conclusively demonstrate this.

Finally, there is correlational evidence to support the process of imaginal confirmation as outlined in this article. The frequency estimate given for an occupation-trait pair should correlate positively with the number of times subjects generated that particular pair in response to a set of generation cues. Un-

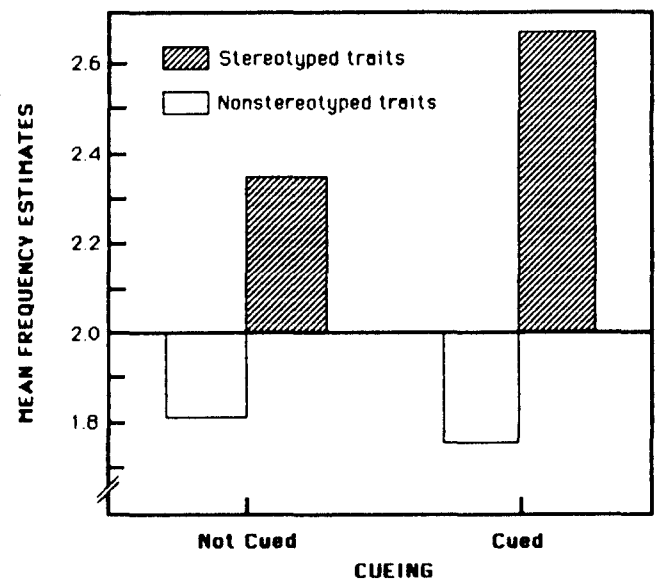


Figure 1. Mean estimates of presentation frequency for stereotyped and nonstereotyped traits as a function of cuing for self-generated imagination.

fortunately, there is no direct way to know exactly what subjects imagined in the generation trials of this experiment. However, subjects in Experiment 1 generated responses to the same cues and recorded what they imagined. The frequencies with which occupation-trait pairs were generated in response to Group ATK and Group WCF sentences were correlated with the frequency estimates of Experiment 2. A positive relation existed, overall  $r(34) = .46, p < .01$ .

### General Discussion

The evidence presented here provides initial support for imaginal confirmation as a process by which stereotypes are maintained. Subjects incorporated common stereotypes into their imaginations. Furthermore, perceived frequencies of stereotype-confirming events were increased by these imagined events. Hence, it appears that a failure in reality monitoring contributes to an increased association of social groups with their stereotypic traits and does so over and above the illusory correlation resulting from prior associations. Consistent patterns were observed across three occupational groups and six stereotyped traits. This suggests that the process may not be confined to the particular stereotypes used in this study but may be generalized to a broader spectrum of stereotypes.

### Laboratory and Real-World Stereotypes

Still, it is difficult to know how far to generalize these results to stereotype maintenance outside the laboratory. The stimulus materials and the frequency-judgment task were rough simulations, at best, of their real-world counterparts. However, there are at least two differences between the laboratory situation and natural settings that suggest the obtained imagination effects may be underestimates rather than overestimates. First, the ratio of imagined confirmations to real confirmations was quite low. Table 1 showed that the intended stereotypic traits were imagined an average of 1.3 times in response to the cues, fewer than the two presentation trials for each. But in natural settings stereotypes may be imagined much more often than the actual perception of valid stereotype-trait occurrences. This may be particularly true as stereotypes are applied to members of minority groups, who by virtue of being in a minority are encountered relatively infrequently. For example, one of the present authors recalls growing up in a small town where, despite the complete absence of black people, the characteristics stereotypically associated with this group were well known, imagined, even taught by the dominant culture. Interestingly, the ratio of imagined stereotyped events to actual (confirming) events could very well be greatest for those stereotypes having the lowest validity. For those stereotypes in particular, actual observation of confirming cases may be relatively infrequent, whereas imagined instances may be quite common.

A second difference concerns the strength of the stereotypes used. Occupational stereotypes are not the most strongly held stereotypes in our society. Experience suggests that racial, ethnic, and sexual stereotypes are much stronger than stereotypes of lawyers, artists, or clergymen. Stronger stereotypes likely lead

to more consistent generation of stereotyped imaginations and, hence, a larger imagination effect.

For these reasons, the effect demonstrated in this work is probably weaker than the natural process it seeks to simulate. Yet, it is an effect that is statistically significant and fairly large in magnitude. If one regards illusory correlation based on prior stereotyped association as a basis for comparison, Figure 1 shows the imaginal-confirmation effect to be of nearly comparable magnitude in these data and, hence, of potentially equal importance.

It is also useful to compare the nature of the imaginal confirmation process with the nature of potential challenges to people's stereotypes. Such challenges may take the form of abstract statistical information, as is often the case when organized minority groups attempt to educate the larger society on the fallacies of common stereotypes. Yet, the imaginal confirmation process is based on the imagination of specific concrete instances that link group members with stereotypic traits. Anderson's (1983a) research indicated that such concrete instances have a stronger effect on people's beliefs than does abstract statistical information. This suggests that imaginal confirmation may be quite effective in maintaining stereotypes in the face of challenges that are presented in an abstract manner.

Understanding stereotype maintenance is important for a number of reasons. It may be that the processes that maintain stereotypes are just special cases of heuristics and cognitive processes. If so, understanding stereotype maintenance may substantiate or clarify more general processes. Also, just as stereotypes represent beliefs about people, cognitive structures exist that contain beliefs about many aspects of a person's environment. The processes by which beliefs in general are perpetuated may be reflected in the processes that maintain stereotypes.

An understanding of stereotype maintenance is important for society as well. An important goal of understanding stereotype maintenance is to understand how the process can be interrupted. In keeping with this practical aspect, future research may be directed toward exploring stereotype maintenance in more applied settings. For example, how does imaginal confirmation affect stereotypes when crimes are reported in the newspaper or on the radio? Do people imagine the crimes to have been committed by minorities and thereby reinforce their stereotypes? What are the effects of stereotype-incongruent events on the imaginal confirmation process? Can observation of such events inhibit the stereotype maintenance process?

Research may also focus on when stereotype maintenance occurs at all in natural settings. Are stereotypes maintained through active assessment of their validity? Particular circumstances may challenge a person's stereotypes and require such a reassessment, which causes the person to reflect on whether the stereotypes are valid. However, the resulting assessment may not increase the accuracy of a person's perception. Such challenges invite people to survey their memories in search of confirming events. They may find such events, based not on objective reality but on the products of their own imaginations.

### Beyond Stereotypes

Social stereotypes are but one form of a broader class of beliefs known as *social theories* (Anderson, Lepper, & Ross,

1980), essentially beliefs about how and why social variables are related. Whereas stereotypes link group membership with personal characteristics, other types of social theories link very different types of social variables. For example, social policy decisions regarding placement of abused children may depend on beliefs that link placement policies to expectations about the social, emotional, and intellectual development of the children (Anderson & Sechler, 1986). Job candidate selection may depend on beliefs that link personality characteristics (e.g., preference for risky over conservative decisions) and job performance abilities (e.g., ability as a firefighter; see, e.g., Anderson & Sechler, 1986). The present findings as well as other recent work (Anderson, New, & Speer, 1985) suggest that imaginal confirmation effects may influence the perseverance of these other types of social theories.

Similarly, Ellsworth proposed that some anomalous findings in the attitude literature on capital punishment may be the result of some imagination process (Ellsworth, 1978; Ellsworth & Ross, 1983). Specifically, it has been found that support for capital punishment dramatically drops as questions change from general ones (e.g., do you believe in capital punishment?) to specific ones concerned with actual capital crimes with all the details. Perhaps the general attitude is based on imagined prototypical scenarios of the most heinous sort without any mitigating circumstances (e.g., mental illness), cases that are extremely unrepresentative. When people judge real capital cases, though, they may see their worst-case scenarios (and general attitudes) as largely irrelevant. But the prototypical worst-case scenarios, confirmed in the imagination, remain quite available and continue to determine the general attitude toward capital punishment.

In sum, our data suggest an important role for imaginal confirmation in stereotype maintenance. It is also clear that the boundary conditions of this effect need to be established, the cognitive processes presumed to underlie this effect must be further specified and tested, and the relevance of this effect to the development, perseverance, and use of other types of social theories should be investigated. A better understanding of the imaginal-confirmation process will not only advance theories of stereotype and other social theory maintenance but also may provide tools for overcoming deleterious effects of unwarranted belief perseverance.

### References

- Alba, J. W., Chromiak, W., Hasher, L., & Attig, M. S. (1980). Automatic encoding of category size information. *Journal of Experimental Psychology: Human Learning and Memory*, 6, 370-378.
- Allport, G. W. (1958). *The nature of prejudice*. Garden City, NY: Doubleday.
- Anderson, C. A. (1983a). Abstract and concrete data in the perseverance of social theories: When weak data lead to unshakeable beliefs. *Journal of Experimental Social Psychology*, 19, 93-108.
- Anderson, C. A. (1983b). Imagination and expectation: The effect of imagining behavioral scripts on personal intentions. *Journal of Personality and Social Psychology*, 45, 293-305.
- Anderson, C. A., Lepper, M. R., & Ross, L. (1980). Perseverance of social theories: The role of explanation in the persistence of discredited information. *Journal of Personality and Social Psychology*, 39, 1037-1049.
- Anderson, C. A., New, B. L., & Speer, J. R. (1985). Argument availability as a mediator of social theory perseverance. *Social Cognition*, 3, 235-249.
- Anderson, C. A., & Sechler, E. S. (1986). Effects of explanation and counterexplanation on the development and use of social theories. *Journal of Personality and Social Psychology*, 50, 24-34.
- Ashmore, R. D., & Del Boca, F. K. (1981). Conceptual approaches to stereotypes and stereotyping. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior* (pp. 1-35). Hillsdale, NJ: Erlbaum.
- Bellezza, F. S., & Bower, G. H. (1981). Person stereotypes and memory for people. *Journal of Personality and Social Psychology*, 41, 856-865.
- Chapman, L. J. (1967). Illusory correlation in observational report. *Journal of Verbal Learning and Verbal Behavior*, 6, 151-155.
- Clark, L. F., & Woll, S. B. (1981). Stereotype biases: A reconstructive analysis of their role in reconstructive memory. *Journal of Personality and Social Psychology*, 41, 1064-1072.
- Crocker, J. (1981). Judgment of covariation by social perceivers. *Psychological Bulletin*, 90, 272-292.
- 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.
- Ellsworth, P. C. (1978). *Attitudes towards capital punishment: From application to theory*. Paper presented at the Society for Experimental Social Psychology Conference, Stanford University, Stanford, CA.
- Ellsworth, P. C., & Ross, L. (1983). Public opinion and capital punishment: A close examination of the views of abolitionists and retentionists. *Crime and Delinquency*, 29, 116-169.
- Gregory, W. L., Cialdini, R. B., & Carpenter, K. M. (1982). Self-relevant scenarios as mediators of likelihood estimates and compliance: Does imagining make it so? *Journal of Personality and Social Psychology*, 43, 89-99.
- Hamilton, D. L. (1979). A cognitive-attributional analysis of stereotyping. In L. Berkowitz (Ed.), *Advances in experimental social psychology: Vol. 12* (pp. 53-84). New York: Academic Press.
- Hamilton, D. L. (Ed.). (1981a). *Cognitive processes in stereotyping and intergroup behavior*. Hillsdale, NJ: Erlbaum.
- Hamilton, D. L. (1981b). Illusory correlation as a basis for stereotyping. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior* (pp. 115-144). Hillsdale, NJ: Erlbaum.
- Hamilton, D. L., & Rose, T. L. (1980). Illusory correlation and the maintenance of stereotypic beliefs. *Journal of Personality and Social Psychology*, 39, 832-845.
- Hasher, L., & Chromiak, W. (1977). The processing of frequency information: An automatic mechanism? *Journal of Verbal Learning and Verbal Behavior*, 16, 173-184.
- Hasher, L., & Zacks, R. T. (1984). Automatic processing of fundamental information: The case of frequency of occurrence. *American Psychologist*, 39, 1372-1388.
- Hastie, R., & Kumar, P. A. (1979). Person memory: Personality traits as organizing principles in memory for behaviors. *Journal of Personality and Social Psychology*, 37, 25-38.
- Hintzman, D. L., & Block, R. A. (1971). Repetition and memory: Evidence for a multiple-trace hypothesis. *Journal of Experimental Psychology*, 88, 297-306.
- Howell, W. C. (1973). Representation of frequency in memory. *Psychological Bulletin*, 80, 44-53.
- Howell, W. C., & Burnett, S. A. (1978). Uncertainty measurement: A cognitive taxonomy. *Organizational Behavior and Human Performance*, 22, 45-68.
- Johnson, M. K. (1977). What is being counted none the less? In I. M.

- Birnbaum & E. S. Parker (Eds.), *Alcohol and human memory* (pp. 43-57). Hillsdale, NJ: Erlbaum.
- Johnson, M. K., & Raye, C. L. (1981). Reality monitoring. *Psychological Review*, 88, 67-85.
- Johnson, M. K., Raye, C. L., Wang, A. Y., & Taylor, T. H. (1979). Fact and fantasy: The roles of accuracy and variability in confusing imaginations with perceptual experiences. *Journal of Experimental Psychology: Human Learning and Memory*, 5, 229-240.
- Johnson, M. K., Taylor, T. H., & Raye, C. L. (1977). Fact and fantasy: The effects of internally generated events on the apparent frequency of externally generated events. *Memory & Cognition*, 5, 116-122.
- Marks, D. F. (1973). Visual imagery differences in the recall of pictures. *British Journal of Psychology*, 64, 17-24.
- Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment*. Englewood Cliffs, NJ: Prentice-Hall.
- Raye, C. L., Johnson, M. K., & Taylor, T. H. (1980). Is there something special about memory for internally generated information? *Memory & Cognition*, 8, 141-148.
- Rosenhan, D. L., Salovey, P., & Hargis, K. (1981). The joys of helping: Focus of attention mediates the impact of positive affect on altruism. *Journal of Personality and Social Psychology*, 40, 899-905.
- Rothbart, M., Evans, M., & Fulero, S. (1979). Recall for confirming events: Memory processes and the maintenance of social stereotypes. *Journal of Experimental Social Psychology*, 15, 343-355.
- Sherman, R. T., & Anderson, C. A. (in press). Decreasing premature termination from psychotherapy. *Journal of Social and Clinical Psychology*.
- Smedslund, J. (1963). The concept of correlation in adults. *Scandinavian Journal of Psychology*, 4, 165-173.
- Snyder, M., & Uranowitz, S. W. (1978). Reconstructing the past: Some cognitive consequences of person perception. *Journal of Personality and Social Psychology*, 36, 941-950.
- Thompson, W. C., Cowan, C. L., & Rosenhan, D. L. (1980). Focus of attention mediates the impact of negative affect on altruism. *Journal of Personality and Social Psychology*, 38, 291-300.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207-232.

### Appendix

Twelve situations were used in the sentences constituting the stimulus materials for Experiment 1. These situations were also used to differentially cue stereotyped traits in the generation trials of Experiment 2. Below, these situations are listed in groups according to the condition in which they appeared in Experiment 2 and in pairs according to the specific trait they were associated with in the individual-situation analysis of Experiment 1.

#### Group ATK

##### aggressive

- . . . is trying to reach the check-out counter in a crowded department store.
- . . . is playing basketball with some friends at a local park.

##### temperamental

- . . . is moving and sees the movers accidentally break a lamp.
- . . . orders a steak cooked rare, but it is closer to medium when it is served.

##### kind

- . . . is approached by a destitute person begging for money along a downtown street.
- . . . is trying to have a quick lunch but is slowed by a waitress new on the job.

#### Group WCF

##### wealthy

- . . . is standing in front of his home.
- . . . is shopping for a car.

##### creative

- . . . is just finishing the dog house he has built.
- . . . is putting out Christmas decorations at his home.

##### friendly

- . . . notices that a family is moving into the house next door.
- . . . is at a social function where he knows very few people.

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