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# One-Shot Illusory Correlations and Stereotype Formation

**Jane L. Risen**  
**Thomas Gilovich**  
**David Dunning**  
*Cornell University*

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*In four studies, the authors explored the emergence of one-shot illusory correlations—in which a single instance of unusual behavior by a member of a rare group is sufficient to create an association between group and behavior. In Studies 1, 2, and 3, unusual behaviors committed by members of rare groups were processed differently than other types of behaviors. They received more processing time, prompted more attributional thinking, and were more memorable. In Study 4, the authors obtained evidence from two implicit measures of association that one-shot illusory correlations are generalized to other members of a rare group. The authors contend that one-shot illusory correlations arise because unusual pairings of behaviors and groups uniquely prompt people to entertain group membership as an explanation of the unusual behavior.*

**Keywords:** *illusory correlations; stereotype formation; distinctiveness*

What one Christian does is his own responsibility, what one Jew does is thrown back at all Jews.

—Anne Frank, May 22, 1944 (Frank, 1993, p. 239)

If there were a social cognition hall of fame, Hamilton and Gifford's (1976) article on illusory correlations and stereotypes would surely be a featured exhibit. Offering an insightful analysis and a telling pair of experiments, they argued that stereotypes sometimes arise not from base human motivations or intergroup conflict but rather from the faulty workings of human memory. Hamilton and Gifford argued that negative behaviors are numerically rare. Thus, when performed by minority group members, who by definition are also

numerically rare, these behaviors become disproportionately memorable, leading to later impressions that minority group members are responsible for more than their fair share of undesirable behavior.

Of critical importance to Hamilton and Gifford's (1976) argument was that no prior expectation regarding the rare groups was necessary to produce their effects, just the unique memorability of rare-group/rare-behavior pairings due to their relative infrequency. Indeed, in their experiments, Hamilton and Gifford exposed participants to purely artificial groups to avoid any influence of preexisting beliefs. In the materials that participants saw, they viewed fewer examples of one group (the minority group) than they did of the other, and they were exposed to one type of behavior (positive or negative) less often than another. Although there was no correlation between group membership and type of behavior in the presented materials (both groups displayed positive and negative behaviors in the same proportion), participants perceived a connection. That is, participants thought that members of the minority group were more likely to exhibit the rare behavior than were members of the majority group.

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Subsequent research by Hamilton, Dugan, and Troler (1985) supported the contention that these sorts of illusory correlations are due to the enhanced availability of jointly distinctive information. In addition to estimating the occurrence of positive and negative behaviors by members of frequently and infrequently presented groups (i.e., Hamilton and Gifford's core paradigm), participants were asked to recall any behaviors they had encountered and the group to which the individuals performing each of these behaviors belonged. As Hamilton and Gifford's (1976) analysis would predict, participants recalled more infrequent-group/negative-behavior pairings than any other combination of group and behavior. In addition, the tendency to recall infrequent-group/negative-behavior pairings correlated with the tendency to report an illusory association between negative behavior and the infrequent group.

Nevertheless, Hamilton and Gifford's (1976) analysis of illusory correlations has been criticized on a number of grounds (Fiedler, 1991; Klauer & Meiser, 2000; Smith, 1991). Some researchers have argued, for example, that Hamilton and Gifford's effect can be explained by an exemplar-based memory system in which one encodes the absolute difference between positive and negative behaviors committed by each group rather than the ratio of positive to negative behaviors (Smith, 1991). The fact that rare-rare pairings are more memorable is irrelevant. Instead, if Group A commits 18 positive behaviors and 10 negative behaviors (difference of 8) and Group B commits 9 positive behaviors and 5 negative behaviors (difference of 4), Group B will be remembered as having performed proportionately fewer positive acts even though the ratio of positive to negative is equal and there is no correlation between group and type of behavior.

Other researchers have maintained that illusory correlations are the result of regressive inferences rather than distinctiveness-based memory biases (Fiedler, 1991). The number of infrequent behaviors committed by members of infrequent groups is overestimated because the stimuli are processed and remembered with less-than-perfect reliability. Under these conditions of information loss, such estimates will regress to the overall mean, and minority group members will be charged with having engaged in more anomalous behavior than they actually have. Still others have noted that the paired-distinctiveness account implies the existence of illusory correlations that people do not, in fact, seem to embrace—for example, that African Americans are more likely than the general population to be left handed (Gilovich, Keltner, & Nisbett, 2006; Sabini, 1995).

These critiques notwithstanding, we believe that the core idea behind Hamilton and Gifford's (1976) analysis is valid. Indeed, we believe that their insight is more

powerful and applies more broadly than the existing literature suggests. The core of Hamilton and Gifford's analysis is that illusory correlations arise because rare-rare groupings are disproportionately available in memory after people survey a series of behaviors from two different groups. Because these pairings are jointly distinctive, they are disproportionately available and more likely than other pairings to be recalled. The illusion arises, in other words, because of the impression that one has witnessed more examples of negative behavior committed by minority group members than was actually the case.

We suggest, however, that there are other forms of distinctiveness that can give rise to illusory correlations that associate rare groups with rare behaviors. We argue that one does not need to survey a series of behaviors performed by common and rare groups for an illusory correlation to emerge. Instead, just one unusual behavior performed by one person from an unfamiliar group is sufficient—leading to a phenomenon we term *one-shot illusory correlations*.

One-shot illusory correlations arise because people often bring knowledge about the prevalence of various human behaviors to bear when witnessing an action performed by another person. Thus, based on a lifetime of experience, a person can code just a single instance of behavior as common or as rare. People are likely to conclude that reading a newspaper or eating a sandwich are common events, whereas wearing a newspaper or kicking a sandwich are unusual. Rare behavior is generally more arresting than common behavior—and more likely to prompt thought and elaboration. Furthermore, a lifetime of interaction yields knowledge about the frequency with which members of different groups are encountered. To someone in the United States, an American would be coded as common but a Sri Lankan would be coded as rare. To Sri Lankans, however, the individuals considered common and rare would likely be reversed.

We contend that distinctive behavior performed by a member of an unusual group is not only arresting but also likely to trigger thoughts that lead to an association between the pertinent group and the behavior. Such associations arise because rare-rare pairings prompt people to entertain the hypothesis that the person's group membership might explain his or her unusual behavior. Such attributional processes are less likely to arise when people see rare group members perform common acts or members of a common group perform unusual acts. As a consequence, a single occurrence of a rare-rare pairing may be sufficient to produce a nascent stereotype in the mind of the perceiver.

For example, when witnessing a Sri Lankan riding a unicycle, people (at least those for whom Sri Lankans are rare) are likely to wonder—however briefly or

implicitly—whether there is any connection between *this* group and *that* behavior. “Are unicycles a prominent part of Sri Lankan culture?” Note that the same question does not arise when a member of the majority group, particularly a member of one’s own majority group, performs the very same behavior. That is, one is unlikely to entertain the hypothesis that one’s status as an English speaker could explain why one rides a unicycle. It has been shown that both unexpected outcomes (Wong & Weiner, 1981) and the actions of minority group members (Hegarty & Pratto, 2001) are especially likely to trigger attributional processing. Putting these two together, we contend that such attributional processing is particularly likely for actions that are jointly distinctive—rare behaviors performed by members of minority groups.

We suggest that this initial query (“Is there a connection?”) will sometimes be embraced and sometimes be rejected as pertinent information is retrieved and considered. However, if the person involved is from a group one rarely encounters and hence knows relatively little about, it is likely that little or no information will be recruited. In that case, the link between the person’s group and the behavior remains, and a unit between the two will be cemented (Heider, 1958). This unit is the core of a one-shot illusory correlation, an incipient belief that might then guide future interactions with members of the relevant minority group, resulting in a more elaborated and firmly held conviction about the minority group in question (Hebl, Foster, Mannix, & Dovidio, 2002; Word, Zanna, & Cooper, 1974).

There are some hints from the illusory correlation literature that rare-rare combinations receive more attributional processing than other sorts of combinations. Using artificial groups, Stroessner, Hamilton, and Mackie (1992) found that participants in a neutral mood spent more time processing sentences describing members of the infrequent group performing infrequent behaviors than sentences describing any other group-behavior combination. Mediation analyses suggested that the differences in processing time produced biased frequency estimates, which in turn produced biased group perceptions.

One comment is necessary about the conditions we suggest are necessary to produce a one-shot illusory correlation. We contend that people will form such correlations when they see a behavior that is rare in their life experiences performed by an individual from a group that is also uncommon in their experiences. That is, the juxtaposition of a rare group member with a rare behavior will be sufficient to produce the correlation. We do not suggest that people form one-shot associations when witnessing behavior that violates their previously held stereotypes of someone from that group. In

addition, we are not suggesting that one-shot associations require that the behavior reinforce their expectations of the specific group in question. In the Sri Lankan example above, we do not suggest that people process the behavior more deeply because they have a prior expectation that Sri Lankans either adore or abhor unicycles. Instead, we argue that it is the overall rareness of the behavior among people in general (e.g., riding a unicycle), irrespective of prior expectations about the group in question (e.g., Sri Lankans), that elicits the processing that links the social group and behavior.

Note also that the various critiques of Hamilton and Gifford’s (1976) findings—all based on alternative interpretations of participants’ responses after witnessing many different behaviors on the part of (statistical) majority and minority group members—do not apply to one-shot illusory correlations. Alternative explanations based on exposure to numerous pertinent instances of behavior play no role because we explore instead the perceptions that arise when a single anomalous action is performed by a member of a minority group. In other words, distinctiveness for Hamilton and Gifford resides in the statistical infrequency of the groups and behaviors presented within the experimental context. In the present case, distinctiveness resides in the fact that the groups and behaviors are unusual in the perceiver’s life experience.

The current exploration of one-shot illusory correlations differs most significantly from past work in that we suggest an additional route that may give rise to illusory correlations linking rare groups and behaviors. Illusory correlations may emerge not simply because distinctive behaviors performed by minority group members are better remembered but because they instigate an attributional process in which group membership is considered a possible explanation of the unusual behavior.

In four studies, we examined the genesis of one-shot illusory correlations. In these studies, we specifically examined (a) whether people process a single incident of an anomalous behavior committed by minority group members differently from the way they process other group-behavior combinations and (b) whether people develop one-shot associations between anomalous behavior and minority groups.

## STUDY 1

An important precondition for the formation of one-shot illusory correlations is that jointly distinctive events elicit more processing than other behaviors do. To examine whether this precondition holds, we presented different behaviors, some common and some anomalous, carried out by single individuals from many different minority and majority groups. We then measured

the time participants took to read each type of group-behavior pairing in such a one-shot context. We predicted that because rare behaviors committed by members of rare groups are more arresting, participants would take more time to read those sentences than any other type of sentence.

### Method

**Participants.** Ninety-nine Cornell University undergraduates participated for extra credit in their psychology and human development courses.

**Procedure.** Participants were presented with 16 sentences in a random order on the computer (17-in eMac). They were instructed to read each sentence carefully and, as soon as they understood it, to press the space bar to advance to the next sentence. The average font size for the text was 34 but was adjusted slightly so that each sentence stretched an equal distance across one line of the screen. Each sentence described an individual member of either a rare or common group performing a rare or common behavior, and each participant read 4 sentences of every common-uncommon group and behavior combination. To illustrate, one of the rare-rare sentences was “Ben, a Jehovah’s Witness, owns a pet sloth,” and one of the common-common sentences was “Jennifer, who was born in New York, drinks coffee every morning.”

Unlike Hamilton and Gifford (1976), who established common and uncommon groups and behaviors based on frequencies of occurrence in the experiment itself, the real-life commonness of both the different groups and the behaviors were established by pretest. Specifically, 20 students rated the commonness of 20 groups on a 5-point scale anchored with *extremely rare* and *extremely common*. A separate group of 40 participants rated the commonness of 26 behaviors on an 11-point scale with the same anchors. Groups and behaviors were classified as common or rare if their average rating was significantly different from the midpoint of the scale.<sup>1</sup>

To ensure that any observed effects were not due to the unusualness of any particular group-behavior pairing, each of the eight groups was randomly paired, across participants, with two rare and two common behaviors, and each of the eight behaviors was randomly paired with two rare and two common groups. This resulted in four different sets of 16 sentences.<sup>2</sup>

Furthermore, to ensure that the rare behaviors were equally unusual whether performed by rare or common group members, 40 participants from the same pool rated how typical the 16 common and rare behaviors were for members of the common and rare groups. For example, participants were asked, “How typical is

playing the harp of people born in New York?” They made their ratings on 11-point scales anchored with *not at all typical of members of the group* and *extremely typical of members of the group*. Participants believed that the common behaviors were more typical of the various groups ( $M = 4.96$ ) than were the rare behaviors ( $M = 1.40$ ),  $t(39) = 13.98$ ,  $p < .001$ . Importantly, participants indicated that the rare behaviors were equally atypical for rare group members ( $M = 1.51$ ) and common group members ( $M = 1.29$ ),  $p > .20$ . This suggests that people do not have differential expectations for how unusual an unusual behavior is for members of the rare and common groups.

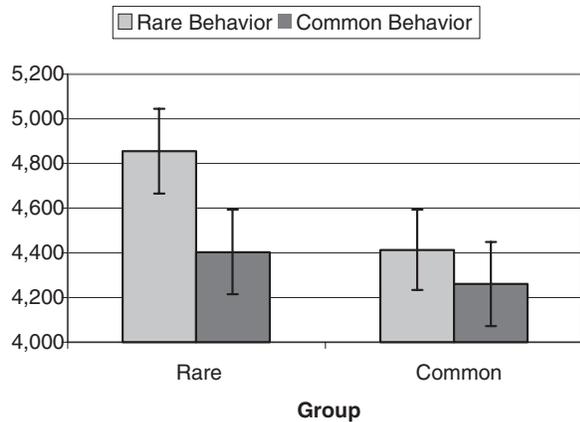
### Results

Because the reading time data were skewed, we used natural log transformations in the analyses, but we report the raw means for ease of interpretation. Preliminary analyses revealed no differences between the four different sets of 16 sentences and so we collapsed across stimulus set. As seen in Figure 1, participants required more time to read the sentences that paired rare groups and rare behaviors than any other group-behavior combination.<sup>3</sup> To assess the statistical significance of this effect, a contrast index was created for each participant by multiplying the average reading time for the rare-group/rare-behavior sentences by 3, and then subtracting the average reading times of each of the other three types of sentences (yielding contrast weights of 3, -1, -1, -1; Rosenthal & Rosnow, 1985). The mean of these contrast indices ( $M = 1,439$  ms) was significantly greater than the null value of 0,  $t(98) = 5.28$ ,  $p < .001$ .

These results demonstrate differential encoding of distinctive information in a one-shot context in which the distinctiveness of the group and behavior were based on participants’ real-life expectations. That is, when a member of a rare group such as a Jehovah’s Witness or an astronomy major performed a rare behavior such as owning a pet sloth or proposing to a girl he had just met, participants required more time to read the sentence. Importantly, because the rare behaviors were equally distinctive, or unusual, whether performed by rare or common group members, the longer processing time cannot be explained by any preexisting associations between any of the behaviors and any of the groups.

### STUDY 2

Study 2 was designed to test whether rare-group/rare-behavior combinations promote a particular type of processing, namely, attributional processing. We contend that one-shot illusory correlations are likely to



**Figure 1** Average reading time in milliseconds for each common-rare group and common-rare behavior combination.

develop between rare groups and rare behaviors because people will spontaneously consider group membership as a potential cause of a rare behavior when the behavior is committed by a member of a rare group but will not consider group membership as a potential cause when the behavior is committed by a member of a common group. The mental energy that people devote to thinking about rare behaviors performed by members of minority groups might be of a rather reflexive, mindless sort, or it may be more effortful and reflective. Either way, we predicted that it would leave its mark and that participants would report wondering more about the link between the behavior and the group for the rare-group/rare-behavior combinations than they would for any other group-behavior combination.

### Method

**Participants.** Forty-five Cornell University undergraduates participated for extra credit in their psychology and human development courses.

**Procedure.** Participants read a packet containing 16 sentences. As in Study 1, each sentence described an individual member of either a rare or common group performing a rare or common behavior, and each participant read 4 sentences of every common-uncommon group and behavior combination. Once again, to ensure that any observed effects were not due to the unusualness of any particular group-behavior pair, participants were presented with one of four possible sets of 16 sentences.

After initially reading the 16 sentences, participants were presented with the sentences a second time. On their second pass, however, they were asked to rate each sentence for how much they earlier had wondered about the connection between the behavior and the group to which

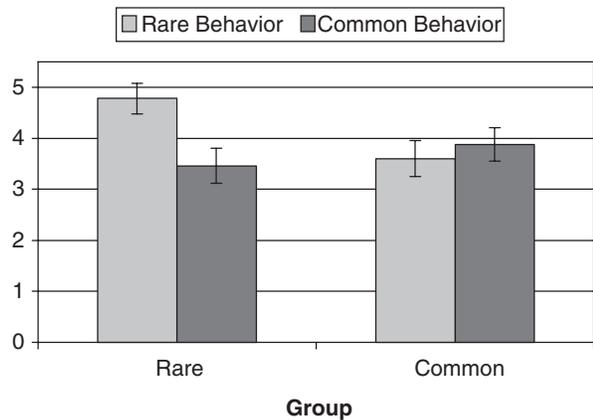
the person belonged.<sup>4</sup> For example, some participants were asked, "How much did you wonder whether there was a connection between being an astronomy major and watching football most Sundays?" Participants responded on an 11-point scale anchored with *I didn't think about it at all* and *I definitely asked myself what the connection was*. The directions specified that participants were not to indicate whether they generally believed there was a connection between the group and the behavior but, rather, to indicate how much they wondered about the connection between the group and the behavior when they first read the sentence.

### Results

Preliminary analyses revealed no differences between the four different sets of 16 sentences, so we collapsed across stimulus set. As seen in Figure 2, participants wondered more about whether a given behavior may have been connected to a particular group when both the behavior and the group were rare ( $M = 4.78$ ) than any other group-behavior combination. As in Study 1, to assess the statistical significance of this effect, a contrast index (with contrast weights 3, -1, -1, -1) was created for each participant. We multiplied the average group-behavior connection ratings for the rare-group/rare-behavior sentences by 3, and then subtracted the average connection ratings of each of the other three types of sentences. The mean of these contrast indices ( $M = 3.42$ ) was significantly greater than the null value of 0,  $t(44) = 5.12$ ,  $p < .001$ . Note that participants were no more likely to wonder about the connection between rare groups and common behaviors ( $M = 3.45$ ) or common groups and rare behaviors ( $M = 3.60$ ) than they were to consider the connection between common groups and common behaviors ( $M = 3.88$ ), suggesting that the result was not driven by rarity per se. Rather, it was the paired distinctiveness of groups and behaviors that led participants to wonder whether membership in the rare group was, in part, responsible for the rare behavior.

### STUDY 3

The results of Studies 1 and 2 indicate that rare behaviors committed by members of minority groups elicit more processing and promote more attributional thinking that focuses on group membership. That is, when encountering rare behaviors committed by minority group members, people are especially likely to consider whether the behavior is connected to the person's membership in his or her group. Study 3 was designed to test whether rare-group/rare-behavior combinations



**Figure 2** Average amount participants said they wondered about a possible link between group membership and behavior for each common-rare group and common-rare behavior combination.

are also more likely to be stored as a unit in memory. In other words, does the additional processing time and attributional thinking demonstrated for rare groups and rare behaviors in Studies 1 and 2 create a memory advantage over other combinations of groups and behaviors? The formation of such a unit is essential to the development of one-shot illusory correlations.

Thus, Study 3 used the same one-shot paradigm as Studies 1 and 2 and presented one behavior, either common or anomalous, carried out by a single individual from each of many different minority and majority groups to examine whether anomalous behaviors on the part of minority group members are particularly memorable. Specifically, after reading about these various group members and their behaviors, participants were asked to match the behaviors they had read about to the individuals who had performed them. We predicted that participants would be more accurate when dealing with members of unusual groups who had performed anomalous behaviors.

## Method

**Participants.** Fifty Cornell University undergraduates participated for extra credit in their psychology and human development courses.

**Procedure.** Participants read a packet containing 16 sentences, with 4 sentences of every common-uncommon group and behavior combination. As in Studies 1 and 2, participants were presented with one of four possible sets of sentences to ensure that any observed effects were not due to the unusual memorability of any particular group-behavior pair.

Participants' memory for the 16 sentences was then assessed with a recall matching task. On one sheet of

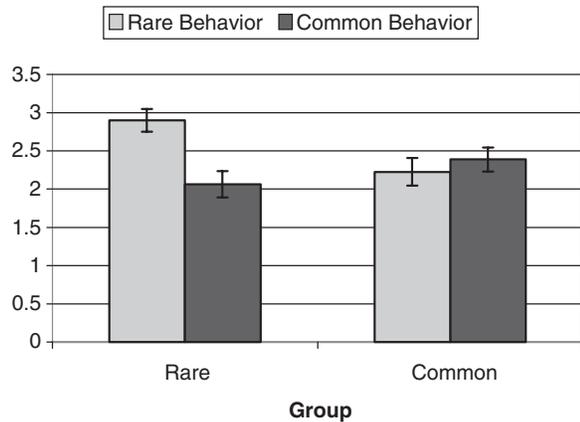
paper, the 16 group members were listed in a random order (e.g., "Ben, a Jehovah's Witness \_\_\_\_") and on another sheet the 16 behaviors (e.g., "\_\_\_\_ refuses to sit in the front seat of a car") were listed randomly along with 20 additional rare and common behaviors. Participants were asked to match the behaviors they had read to the appropriate targets. The behaviors were listed so that participants could not use gender as a cue (e.g., "eats spaghetti with his/her hands").

## Results

Preliminary analyses revealed no differences between the four different sets of 16 sentences, so we collapsed across stimulus set. As seen in Figure 3, participants remembered the rare-group/rare-behavior combinations better than any of the other three combinations. To assess the statistical significance of this effect, a contrast index was created for each participant by multiplying the number of rare-group/rare-behavior sentences recalled by 3 and then subtracting the number of sentences recalled of each of the other three types (yielding contrast weights of 3, -1, -1, -1; Rosenthal & Rosnow, 1985). The mean of these contrast indices ( $M = 2.1$ ) was significantly greater than the null value of 0,  $t(49) = 5.46$ ,  $p < .001$ . We should note that the rare-group/common-behavior and common-group/rare-behavior sentences were no more likely to be remembered than the sentences that paired common groups and common behaviors, suggesting that the result was not driven by differential attention to any single unique stimulus. Rather, it was the paired distinctiveness of rare groups and rare behaviors that created the advantage in memory.<sup>5</sup>

Note that any preexisting associative links between the rare groups and rare behaviors were not any more pronounced than those for any of the other behavior-group combinations. As reported above, the rare behaviors were considered equally typical for rare and common group members. Unicycles were not thought to be a more common mode of transportation for Mormons than for Catholics, for example. Despite this absence of any preexisting connection, rare behaviors on the part of rare group members were sufficiently arresting that their memorability was enhanced.

One possible concern with the results from Studies 1, 2, and 3 is that the valence of the behaviors rather than their rarity drove the observed effects. Although Hamilton and Gifford (1976) noted that negative behavior tends to be less common than positive behavior, they took pains to show that it was not negativity per se that led to the formation of illusory stereotypes of minority groups. To do the same in our studies, we asked a separate group of 20 participants to rate the valence of each of the behaviors on an 11-point scale,



**Figure 3** Number of items (out of four) recalled from each common-rare group and common-rare behavior combination.

anchored from 0 (*very negative*) to 10 (*very positive*). Overall, the rare behaviors were judged to be more negative than the common behaviors (rare  $M = 3.9$ ,  $SD = 0.8$ ; common  $M = 5.8$ ,  $SD = 0.9$ ),  $t(19) = 6.85$ ,  $p < .001$ . However, although rare behaviors were judged to be more negative than common behaviors on average, only four of the eight were seen as negative in an absolute sense. When we break down our analyses by negative and nonnegative rare behaviors, we find that valence does not account for our results. In Study 1, participants took the same amount of time to process the two types of rare behaviors performed by members of unusual groups (negative:  $M = 5,187$  ms,  $SD = 2,454$ ; nonnegative:  $M = 5,354$  ms,  $SD = 3,285$ ),  $t(98) < 1$ . In Study 3, participants were equally likely to remember the rare-rare combinations involving negative behaviors ( $M = .76$ ,  $SD = .36$ ) and those involving nonnegative behaviors ( $M = .75$ ,  $SD = .34$ ),  $t(48) < 1$ .

In Study 2, participants wondered more about the rare negative behaviors than the rare nonnegative behaviors, but this was true regardless of whether the behavior was committed by a rare or a common group member. A repeated-measures ANOVA of the amount participants wondered about the link between negative versus nonnegative rare behaviors performed by rare versus common group members yielded significant main effects for the rarity of the group member,  $F(1, 44) = 16.94$ ,  $p < .001$ , and for the negativity of the behavior,  $F(1, 44) = 6.79$ ,  $p = .012$ , but no hint of a significant interaction,  $F < 1$ . Thus, negativity encouraged participants to wonder about the link between the behavior and the group, but this does not explain the increased amount of wondering for rare-group/rare-behavior combinations. Together, these results demonstrate that the documented effects for processing time, attribution, and memory were due to the paired distinctiveness of rare

behaviors and rare groups and not to the pairing of negative behaviors and rare groups.

## STUDY 4

The results of Studies 1, 2, and 3 establish the existence of the psychological processes that are essential for the formation of one-shot illusory correlations. A single anomalous behavior on the part of a minority group member tends to elicit greater cognitive processing (Study 1) devoted to trying to understand (Study 2) if there is any connection between the type of behavior encountered and the group to which the actor belongs. This attributional activity promotes the formation of a unit between the group and the behavior and makes the combination of actor and action particularly memorable (Study 3). Study 4 goes beyond the examination of these important elements of one-shot illusory correlations to examine the illusory correlations themselves.

Study 4 uses a pair of implicit measures to examine whether the unit that people tend to form between minority group members and single instances of anomalous behavior generalizes to other members of the group in question. One measure, involving a word completion task, examined whether a given characteristic was implicitly associated with a distinctive group if one of its members displayed that characteristic on one occasion. The other measure examined whether people would selectively seek out further evidence of that characteristic from another member of the relevant distinctive group. Past work has shown that if people hypothesize that another person has a given characteristic, they will tend to seek out affirmative evidence of that characteristic in that person (Snyder & Swann, 1978). Thus, we predicted that an association between a minority group and an anomalous behavior would lead participants to search for evidence of the anomalous behavior when interviewing another member of the minority group.

### Method

**Participants.** One hundred thirty-three Cornell undergraduates (81 Caucasian, 36 East Asian, 9 African American, and 7 Hispanic) volunteered for an experiment on impressions formed on the basis of different types of information. They received extra credit toward their course grades for taking part.

**Procedure.** The first part of the experiment, participants were told, involved watching a video presentation of several students being interviewed by a student filmmaker. Embedded in the video was an interview with either a South Asian or Caucasian student coached to

appear unusually pushy. Specifically, the student repeatedly asked if she could borrow the filmmaker's camera and, when her request was denied, she persisted in her request—with one weak rationale after another—well beyond what nearly anyone would consider proper.<sup>6</sup> Because unusually pushy behavior may seem more negative than unusual (if, for example, one stresses the latter word rather than the former), we had a separate group of participants watch and rate the video to make sure the target person's behavior was indeed seen as unusual rather than negative. Specifically, 30 participants rated their overall impression of each student depicted in the video and answered an additional question about each interview. For the interview of the pushy target person, participants were asked, "She really wants to borrow the camera. Did you interpret this particular behavior as something negative or unusual?" Participants responded on an 11-point scale, anchored at 0 with *negative* and at 10 with *unusual*. Participants rated the behavior as significantly more unusual than negative, yielding a mean rating that was significantly different from the midpoint of the scale ( $M = 6.6$ ,  $SD = 3.4$ ),  $t(29) = 2.61$ ,  $p = .014$ . There was also no significant difference in how unusual the behavior of the South Asian ( $M = 6.5$ ,  $SD = 3.3$ ) and Caucasian ( $M = 6.8$ ,  $SD = 3.7$ ) student was deemed to be,  $t < 1$ .

After watching the video, participants were told—in line with the cover story—that their next task was to form an impression of someone (either a South Asian or a Caucasian man) while simultaneously being occupied by a second task. Participants then watched, on video, as the target individual held up cards depicting words with missing letters. Participants were to fill in the blank spaces to form words as the student displayed each card. Ten of the 20 letter strings could be completed either with pushy or nonpushy words (e.g., D E \_ \_ N D could be filled in with the pushy word *demand* or the nonpushy word *depend*).<sup>7</sup> Following Gilbert and Hixon (1991), we reasoned that if participants had earlier formed a link between pushy behavior and South Asians, the likelihood of filling in the missing letters to form a word related to pushiness would increase when the letter strings were being displayed by a South Asian target.

Afterward, participants were informed that their final task was to interview another participant online. If they had seen a South Asian displaying the letter strings in the earlier video, they were told they would be interviewing Deepak Raje and were given a Polaroid picture of a South Asian man. If a Caucasian had earlier displayed the letter strings, they were told they would be interviewing Jon Miller and were given a Polaroid picture of a Caucasian man. Participants were then given a list of 20 questions from which they were to choose 10 to ask in the interview. Eight of the questions related to pushiness (e.g.,

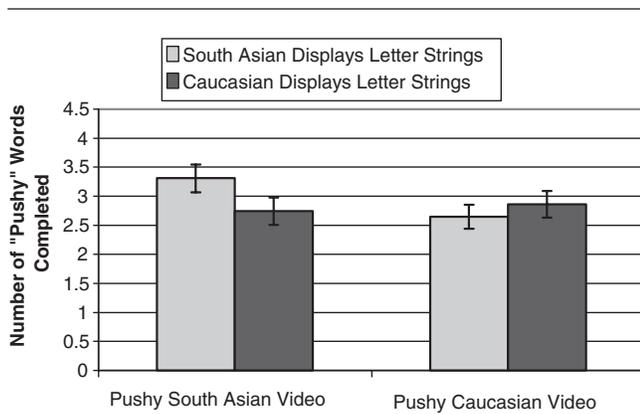
"Do you respect or resent salespeople who won't take no for an answer?") and 12 were fillers (e.g., "Where do you go when you need to study?"). We reasoned that if participants had earlier linked South Asians with pushiness, the likelihood of asking the South Asian (but not the Caucasian) questions related to pushiness would be increased. The experimenter then conducted a funnel debriefing to determine whether participants had any suspicions about the true purpose of the study.

### Results

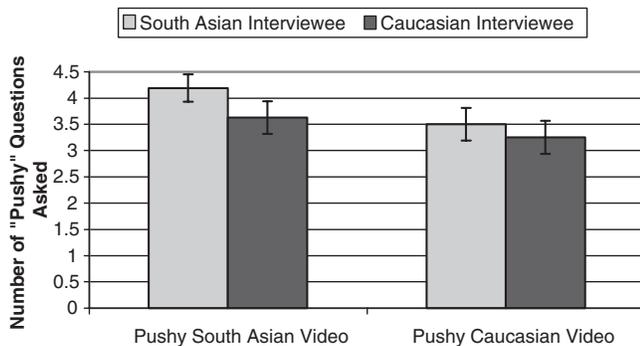
The data from 24 participants (18%) were excluded from the analyses because they either knew one of the actors in the video ( $n = 3$ ) or expressed some suspicion about the true purpose of the study ( $n = 21$ ). The final sample included 64 Caucasian, 30 East Asian, 8 African American, and 7 Hispanic participants.

*Word completions.* As expected, participants who had witnessed a South Asian woman being pushy in the first videotape and who saw a South Asian man displaying the letter strings generated the greatest number of pushy word completions (see Figure 4). A planned contrast comparing the number of word completions in this condition with the number of word completions in the other three conditions (contrast weights: 3, -1, -1, -1) established this pattern to be significant,  $t(105) = 2.07$ ,  $p < .05$ . There were no differences in the number of pushy word completions by participants in the other three conditions, all  $ts < 1$ . Thus, participants who earlier had seen a South Asian student act pushy appeared to develop an association between pushiness and South Asians, whereas those exposed to a Caucasian who acted pushy did not form an association between pushiness and Caucasians.

*Questions asked.* Participants who had been exposed to a pushy South Asian also chose more questions related to pushiness for their subsequent interview of a South Asian target person, providing further evidence that a link had been formed between group and trait. As can be seen in Figure 5, questions related to pushiness were asked most often by participants who were interviewing a South Asian man and had earlier seen the video that included a pushy South Asian women. A planned contrast comparing the number of pushiness questions asked by participants in this condition with the number asked by participants in the other three conditions (contrast weights: 3, -1, -1, -1) yielded a significant difference,  $t(105) = 2.04$ ,  $p < .05$ . There were no differences in the number of questions related to pushiness asked by participants in the other three conditions, all  $ts < 1$ .



**Figure 4** Number of pushy words completed (out of 10) by participants viewing a South Asian or Caucasian male student displaying letter strings who had earlier seen a video containing a pushy South Asian or Caucasian female student.



**Figure 5** Number of questions related to pushiness (out of eight) asked by participants interviewing either a South Asian or Caucasian male student who had earlier seen a video containing a pushy South Asian or Caucasian female student.

*Rare group versus outgroup status.* The procedures for Study 4 contain a possible confound. For those in a majority group, such as Caucasian participants in Study 4, the rare group is also an outgroup—and perhaps it was the outgroup status of South Asians rather than their rarity that caused participants to make a connection between South Asians and pushiness. Therefore, to ensure that our results reflect the formation of a one-shot illusory correlation based on rarity rather than on outgroup status, it is necessary to compare the responses of Caucasian and minority participants. If our results reflect a tendency to associate unusual behavior with outgroups rather than with rare groups, minority participants should have developed an association between pushiness and both South Asians and Caucasians. But if, as we suggest, people associate unusual behavior with rare groups, the responses of minority participants should be the same as those of Caucasian participants, reflecting an association

between pushiness and South Asians but not between pushiness and Caucasians.

To determine whether there were any differences in the responses of Caucasian and minority participants, we standardized the number of pushy words generated in the letter string task and the number of pushy questions asked in the interview and averaged them to form a composite of our two dependent measures. We then created a participant ethnicity variable (Caucasian,  $-1$ ; minority,  $1$ ), a planned contrast variable to reflect the hypothesis that participants would form an association between pushiness and South Asians but not between pushiness and Caucasians (South Asian video–South Asian dependent variable,  $3$ ; South Asian video–Caucasian dependent variable,  $-1$ ; Caucasian video–South Asian dependent variable,  $-1$ ; and Caucasian video–Caucasian dependent variable,  $-1$ ) and a term representing the interaction between participant ethnicity and the contrast variable. A linear regression predicting the composite dependent measure yielded only a significant effect for the contrast,  $t(105) = 2.24, p < .05$  (echoing the results of the one-way ANOVAs described earlier). Neither the main effect of participant ethnicity nor the interaction was significant, both  $ts < 1$ .

Moreover, when we restricted our analyses to the 45 minority participants (none of whom were South Asian), we found the same results as we had for the entire sample. A planned contrast comparing the responses (composite dependent measure) of minority participants in the South Asian–South Asian condition with the responses of minority participants in the other three conditions (contrast weights:  $3, -1, -1, -1$ ) yielded a difference that just missed being conventionally significant,  $t(41) = 1.98, p = .06$ . Both of these analyses make it clear that minority participants responded the same as their Caucasian counterparts did. East Asian, African American, and Hispanic participants tended to form a one-shot association between pushiness and South Asians but not between pushiness and Caucasians.

### Discussion

Studies 1, 2, and 3 demonstrated that anomalous behaviors committed by minority group members are processed differently than other types of behaviors. They elicit greater cognitive processing, promote more attributional thinking focused on group membership, and are more likely to be stored as a unit in memory. Study 4 went beyond the previous three studies to demonstrate that people do indeed develop illusory correlations between anomalous behaviors and minority groups when they are confronted by such jointly distinctive information in a real-life one-shot context. Specifically, in Study 4 we found evidence for the

group-behavior association being generalized to other members of the minority group and influencing subsequent interactions with members of that group.

## GENERAL DISCUSSION

The results of these four experiments suggest that members of minority groups are suspect—not in *Webster's* (1991) sense of “to have doubts of” or “to imagine to be guilty” (although members of some minority groups face that too)—but suspect in the sense of their minority group status being a candidate explanation whenever they engage in unusual behavior. Across four studies, we obtained evidence that people process information about rare group members performing anomalous behavior differently than all other group-behavior combinations. Relative to members of common groups performing the same rare behavior, or anybody performing a common behavior, participants spent more time reading when confronted with a rare-rare pairing (Study 1), reported wondering more about a link between rare groups and rare behaviors (Study 2), and better recalled rare behaviors performed by members of rarely encountered groups (Study 3). They also showed evidence of the beginning of a social stereotype. Traits associated with a rare behavior that was displayed by a member of a rare group were activated when participants were exposed to another member of the rare group (Study 4).

We have suggested that when a person belonging to a rarely encountered group engages in rarely seen behavior, people may wonder whether the individual has behaved that way because he or she is a member of that group, and thus they begin to form a link between group and characteristic. “Are members of that group especially likely to engage in that sort of behavior?” Note that people are less likely to ask that question when it is a member of a majority or more familiar group who engages in such behavior. Thus, an association between a given behavior and the group to which the person performing that behavior belongs is much more readily formed when both the behavior and the group are jointly distinctive. Joint distinctiveness prompts attributional analysis—whether implicit or explicit—that can form a link between the unusual behavior and the rarely encountered group.

The initial link between minority groups and unusual behavior can affect subsequent interaction, thereby giving rise to more firmly held and consequential stereotypes. As we saw in Study 4, for example, participants who were exposed to anomalous actions on the part of a minority group member were especially likely to ask another member of that group whether he possessed characteristics reflective of those actions. A one-shot

illusory correlation based on rather reflexive and even implicit processing can therefore set the stage for more elaborate stereotypes.

In all four studies, we made sure that the documented association between rare groups and rare behaviors was due to the behavior's rarity rather than its valence. By splitting the rare behaviors into those that were negative and those that were not, we established that valence could not account for the results of Studies 1, 2, and 3. In Study 4, we had a separate group of participants confirm that we were successful in creating a behavior that was unusual rather than negative. Also, by examining the responses of minority participants in Study 4, we were able to establish that the one-shot association formed between pushiness and South Asians reflected a tendency to associate unusual behavior with rare groups, not with outgroups. Taken together, our results demonstrate that even in a one-shot context, illusory correlations seem to arise from paired distinctiveness rather than from the pairing of rare groups with negative behaviors or rare behaviors with outgroups.

Our results reinforce the validity of the core idea underlying Hamilton and Gifford's (1976) analysis of distinctiveness-based illusory correlations but provide another route, and another circumstance, by which distinctiveness can prompt stereotyping. The Hamilton and Gifford analysis focused on the memorability of rare-rare combinations and on how illusory correlations could be built up over time as an individual becomes aware of distinctive information by observing members of majority and minority groups engaging in all sorts of common and uncommon behavior. The unusual behaviors performed by members of minority groups stood out in memory against the backdrop of all the actions observed.

We have focused instead on a different process by which distinctiveness gives rise to illusory correlations and can do so in a one-shot context. A single action by another can be coded as unusual or common based on a lifetime of experience. Unusual actions on the part of minority group members exert disproportionate weight on judgment not simply because they are better remembered but because they instigate an attributional process in which group membership is considered as a possible explanation of the unusual behavior. Members of minority groups are thus unfairly at risk of generating one-shot illusory correlations whenever they engage in behavior that lies outside the mainstream.

As Anne Frank noted during her short life, what a member of the majority does is that person's own responsibility, but what a minority group member does has implications for his or her entire group. Our analysis suggests that this process might be a ubiquitous feature of social inference.

## NOTES

1. The common groups were Democrat, Protestant, American, born in New York, psychology major, sorority member, Catholic, and Caucasian, and the uncommon groups were Jehovah's Witness, Mormon, born in Idaho, Native American, member of the Amateur Radio Club, astronomy major, Libertarian, and Turkish. The common behaviors were not making the bed in the morning, studying in the library, watching football most Sundays, using ketchup and mustard on hamburgers, buying a new computer to start school, exercising at the gym regularly, owning a cat, and drinking coffee every morning, and the rare behaviors were riding a unicycle to class, sleeping in a tent in bedroom, refusing to sit in the front seat of the car, owning a pet sloth, eating spaghetti with hands, proposing to a girl a week after meeting her, plays the harp, and completed holiday shopping before Halloween.

2. The only exception to purely random pairing was that only male targets proposed to a girl and watched football most Sundays and only female targets played the harp.

3. All of the reported results remain unchanged if the data are analyzed at the level of the syllable rather than at the level of the sentence. The analysis by syllable was conducted by dividing the reading time for each sentence by the number of syllables in that sentence and comparing the average speed required to read rare-group/rare-behavior syllables to the average speed required to read syllables of other group-behavior combinations. Results indicate that participants took longer, on average, to read a syllable of a rare-group/rare-behavior sentence than a syllable of any other type of sentence.

4. A smaller, separate group of participants was asked to rate the amount they wondered about the link between group and behavior as they read through the sentences for the first time. We found the same pattern of data for this more spontaneous, less retrospective measure.

5. To ensure that the memory advantage for rare-group/rare-behavior sentences reflected one-shot illusory correlations based on paired distinctiveness rather than a guessing strategy based on the expectation that strange groups "go with" strange behaviors, we analyzed participants' incorrect answers. When participants recalled the wrong behavior for a rare group member, they recalled a rare behavior 43% of the time. When participants recalled the wrong behavior for a common group member, they recalled a rare behavior 39% of the time. Because the incorrect rare behaviors were equally luring for the rare and common group members, it appears that the memory advantage was due to paired distinctiveness and not to strategic guessing.

6. To ensure that pushiness is not considered by our subject population to be characteristic of South Asians, we asked an additional 40 Cornell students to rate, on an 11-point scale, the extent to which they associate either people with a South Asian or European heritage with 16 traits, including the traits pushy and demanding. We averaged participants' responses to those traits and found that South Asians are not considered pushy. Neither those of South Asian ( $M = 5.21$ ) or European ( $M = 6.19$ ) heritage were rated as significantly higher or lower than the midpoint of the scale, although South Asians were rated as significantly less pushy and demanding than those of European heritage,  $t(38) = 2.12, p < .05$ . Thus, any preexisting associations U.S. college students have to South Asians work against the hypothesis under investigation.

7. The 10 pushy words were *forceful, pushy, demand, assertive, unrelenting, determined, insistent, rude, persist, and obnoxious*.

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