Journal of Personality and Social Psychology
2007, Vol. 92, No. 5, 821–833

Copyright 2007 by the American Psychological Association
0022-3514/07/$12.00 DOI: 10.1037/0022-3514.92.5.821

Inferring the Popularity of an Opinion From Its Familiarity: A Repetitive Voice Can Sound Like a Chorus

Kimberlee Weaver
Virginia Polytechnic Institute

Stephen M. Garcia and Norbert Schwarz
University of Michigan

Dale T. Miller
Stanford University

Despite the importance of doing so, people do not always correctly estimate the distribution of opinions within their group. One important mechanism underlying such misjudgments is people's tendency to infer that a familiar opinion is a prevalent one, even when its familiarity derives solely from the repeated expression of 1 group member. Six experiments demonstrate this effect and show that it holds even when perceivers are consciously aware that the opinions come from 1 speaker. The results also indicate that the effect is due to opinion accessibility rather than a conscious inference about the meaning of opinion repetition in a group. Implications for social consensus estimation and social influence are discussed.

Keywords: pluralistic ignorance, public opinion, social influence, familiarity, focus groups

From college students gauging their peers' views on alcohol, to stockbrokers speculating about consumers' confidence in the market, to everyday Americans wondering how scared others are about terrorism, our estimates of group opinion affect not only the decisions we make on behalf of groups but also our perceptions of reality (Asch, 1951; Deutsch & Gerard, 1955; Fishbein & Ajzen, 1972; Miller & Prentice, 1996; Moscovici, 1985; Newcomb, 1943; Sherif, 1936; Terry & Hogg, 1996). A perceiver estimating that others are highly concerned about terrorism, for instance, may become more personally fearful, may go to fewer public events, and may even decide to take a job in a safer city than might one who believes that others are more at ease. Researchers have a detailed understanding of how group norms affect group members' cognition, emotion, and behavior. Surprisingly, however, much less is known about how people actually construct estimates of collective sentiment in the first place (for notable exceptions, see Hamill, Wilson, & Nisbett, 1980; McFarland & Miller, 1990; Prentice & Miller, 1993; Quattrone & Jones, 1980). In this article, we examine the process by which perceivers integrate information about the number of times they have heard a sentiment expressed with information about the number of people who have expressed it.

To illustrate this problem, suppose that faculty members are deciding whether to offer additional graduate courses next fall and they want to estimate the collective opinion of the graduate students. Suppose further that Sarah, a student in the department, has spoken with the faculty many times about her desire for more courses. Will Sarah's frequent statements contribute more than her fair share to the faculty's sense of how many students desire additional courses? Our studies provide strong support that this is the case.

Specifically, we propose that people draw on two sources of information when estimating the prevalence of an opinion. First, when perceivers have prior knowledge of a group, they are likely to have information about the actual extensity of the opinion or the range of group members who support it. Second, a given opinion may seem more or less familiar, and this subjective sense of familiarity may serve as information in estimating the extensity of the opinion. We propose that the more often an opinion has been encountered in the past, the more accessible it is in memory and the more familiar it seems when it is encountered again. When multiple previous exposures are due to expressions of the same opinion by different communicators, familiarity is a valid cue for estimating extensity. We assume, however, that feelings of familiarity increase with the number of exposures, independent of their

Kimberlee Weaver, R. B. Pamplin College of Business, Virginia Polytechnic Institute; Stephen M. Garcia, Gerald R. Ford School of Public Policy, University of Michigan; Norbert Schwarz, Department of Psychology, Institute for Social Research, and Ross School of Business, University of Michigan; and Dale T. Miller, Graduate School of Business, Stanford University.

An earlier version of this article was awarded the Franco Nicosia Award for Best Competitive Paper at the annual meeting of the Association for Consumer Research, Portland, Oregon, October 2004. This research was supported by a research grant from the R. B. Pamplin College of Business at Virginia Polytechnic Institute awarded to Kimberlee Weaver, National Institute of Health National Research Service Award Postdoctoral Fellowship F32HD047227 awarded to Kimberlee Weaver and Norbert Schwarz, and a fellowship from The Program on Negotiation at Harvard Law School and a Horace Rackham Faculty Grant from the University of Michigan awarded to Stephen M. Garcia.

We thank Elizabeth Brisson, Barbara Gani, Brian Hartman, Laura Padalino, and Alex Radetsky for their help collecting the data for Studies 1A, 1B, and 3 and Max Bazerman, Joel Cooper, Adi Livnat, Debbie Prentice, and the members of the Social Cognition Research Group at the University of Michigan for valuable comments on an earlier version of this article.

Correspondence concerning this article should be addressed to Kimberlee Weaver, R. B. Pamplin College of Business, Virginia Polytechnic Institute, 2042 Pamplin Hall, Blacksburg, VA 24061. E-mail: kdweaver@vt.edu

source. If so, then hearing the same opinion, say, three times from the same communicator may result in the erroneous impression that it is widely shared—an overestimation of extensity. The present studies test these hypotheses and provide the first evidence that repetition of the same opinion gives rise to the impression that the opinion is widely shared, even if all the repetitions come from the same single communicator.

Repetition and Memory Distortion

One reason why people may infer wide support for an issue following frequent statements by one source is memory distortion. If Sarah makes three statements in favor of more courses, then faculty who wrongly remember other students making some of the statements will estimate more group support than will those accurately remembering Sarah as the only source. Research on memory and stereotyping, for instance, shows that when memory load prevents observers from attending to source information, repeated information about single group members spills over into the impression formed of the group (Rothbart, Fulero, Jensen, Howard, & Birrell, 1978). Rothbart et al. (1978) varied memory load by presenting observers with either 16 or 64 name–trait pairings of the form "John is creative." They also manipulated whether participants saw duplicate information about the individual group members. Half of their participants saw repeated presentations of the same name–trait pairings, whereas the other half saw the traits the same number of times but each time a trait was presented it was paired with a different name.

Duplicate information about individuals spilled over into observers' group-level judgments more when the observers were under high rather than low memory load. That is, when observers were presented with 64 name–trait pairs, they failed to remember which trait belonged to which group member and thus confused repeated presentations of a trait within an individual with repeated presentations of the trait across the group. In contrast, observers with only 16 pieces of information to integrate were better able to differentiate information about unique individuals in the group. These judgmental differences can be understood through the memory-based versus online judgment model (Hastie & Park, 1986). People under low load used memory-based processing to organize information around individual group members, whereas those under high load were forced to use online processing and organized the information more indiscriminately around the group as a whole.

Repetition, Fluency, and the Subjective Experience of Familiarity

Although memory distortion is one reason why people may estimate wider support for an issue after repeated opinions from one source, it may not be required to produce this effect. Recent research shows that thinking is accompanied by a variety of metacognitive experiences, like the subjective ease or difficulty with which information can be recalled from memory, arguments can be generated, or new information can be processed (for a review, see Schwarz, 2004). These subjective experiences are informative in their own right, and people draw on them in making a variety of judgments. For example, judgments of frequency are often based on the ease with which relevant examples can be brought to mind, as predicted by Tversky and Kahneman's (1973) availability heuristic. Similarly, recognition experiments show that people often determine whether they have seen a stimulus before by drawing on the ease with which it can be perceived (for a review, see Kelley & Rhodes, 2002). Because previously seen stimuli are easier to process, any variable that facilitates processing fluency—like high figure–ground contrast or a longer presentation time—gives rise to erroneous recognition of a new stimulus as previously seen. Subjectively, ease of processing is experienced as a sense of familiarity, reflecting that, all else being equal, familiar stimuli are easier to process than are novel ones.

Studies manipulating feelings of familiarity through repeated exposure have shown that it can affect people's judgments in unintended ways. For instance, people judge stimuli they have seen before as more attractive (Zajonc, 1968), judge names they have seen before as more famous (e.g., Jacoby, Kelley, Brown, & Jasechko, 1989), and judge statements they have read before as more valid (e.g., Hasher, Goldstein, & Toppino., 1977; Skurnik, Yoon, Park, & Schwarz, 2005) compared with baseline participants. People make similarly biased judgments about stimuli that are fluently processed for reasons other than repetitive presentations. For example, substantively equivalent statements are more likely to be accepted as true when they rhyme than when they do not (McGlone & Tofighbakhsh, 2000) or when the color of the print font makes them easy rather than difficult to read (Reber & Schwarz, 1999).

The observed influence of repetition and processing fluency on judgments of truth is particularly relevant to the present research. As Festinger (1954) observed, people often rely on social consensus as a heuristic cue in assessing truth—if many believe it, then there is probably something to it. Because fluent processing of a statement gives rise to a sense of familiarity, it suggests that one must have heard something similar before, which increases acceptance of the statement. Extending this logic, we propose that a similar process applies to estimates of the prevalence of an opinion: The more familiar the opinion seems, the more perceivers assume that they have heard this opinion many times before. In many situations, this means that they were exposed to the opinion on different occasions, probably by different communicators. If so, reliance on the opinion's familiarity would be a valid cue for estimating the opinion's prevalence. However, feelings of familiarity are relatively insensitive to the source from which they derive, or else rhyming forms (McGlone & Tofighbakhsh, 2000), an easy to read print font (Reber & Schwarz, 1999), or multiple repetitions of a statement within an experiment (Skurnik et al., 2005) would not have the observed effects on judgments of truth. Accordingly, hearing the same opinion multiple times may induce the same feeling of familiarity, independent of whether it was presented by multiple different communicators. If perceivers are not sensitive to the source of familiarity, then numerous opinion statements by one group member may actually influence the inferences observers make about the number of group members supporting an issue.

This rationale predicts (i) that people infer that an opinion is more widely shared the more often it is repeated, even when (ii) the repetition merely consists of the same person saying the same thing multiple times. It further predicts (iii) that the effect of repetition on extensity estimates is mediated by the accessibility and familiarity of the opinion and (iv) increases over time, as

details of the exposure episode become less accessible, making it less likely that perceivers realize that all statements came from the same communicator. Finally, (v) the impact of repetition should be most pronounced when perceivers lack more diagnostic information about the distribution of the opinion, as is the case when they make judgments about unfamiliar groups.

The Present Research

In the first section of this article (Studies 1A and 1B), we test the basic hypothesis that perceivers will estimate more widespread support for an opinion after hearing one group member advance it repeatedly than after hearing the same person express the same opinion only once. In the second section (Studies 2 and 3), we seek to understand the psychological mechanism driving this proposed effect by distinguishing between two types of explanations, one based on a model of metacognitive processes described above and the other based on conscious inferences perceivers may make about group dynamics and the meaning of opinion repetition in a group. The final section (Studies 4 and 5) examines boundary conditions of the proposed effect by focusing on the moderating role of known versus unknown group norms.

The Basic Effect: Studies 1A and 1B

Study 1A: Preserving Open Space in New Jersey

Method

In Study 1A, participants read opinion statements taken from a supposed focus group discussion. We predicted that observers would estimate more widespread support for the issue after reading one group member reiterate an opinion three times than they would after reading the same person express the same point only once.

Participants. A total of 177 University of Michigan undergraduates participated. Sixty-seven received $8 for completing the study within a larger questionnaire packet. The remaining 110 participants were recruited in public places on campus. Opinion familiarity and opinion source were manipulated in a three-condition between-subjects design. Participants in the three person control condition read three opinion statements each made by a different group member (Jim, Mark, and John), those in the repeated opinion condition read the same three statements but they were all attributed to one group member (Jim), and those in the single opinion control condition read one opinion statement from one group member (Jim).

Procedure. Participants were told that the researchers were interested in an issue from the last New Jersey state election, namely whether land should be set aside to preserve open space in the state (a fictitious issue created for the purpose of this experiment). A representative focus group of five New Jersey homeowners had met to discuss their opinions on the issue. Participants in the three person control and repeated opinion conditions read, "Three of the comments made during the focus group have been randomly selected and are printed below, along with the homeowner's name. Because this was a random process, selected statements may be from one person or, at most, three different people." The single opinion control condition was worded similarly but only referenced one comment.

Participants then saw either the following three opinion statements or one randomly selected opinion statement, all intended to convey the opinion that open space should be preserved for recreational purposes: "I am in favor of open space because it is important that people have opportunities for outdoor recreation," "I think that open space is a good idea because more open space in New Jersey means that we will all have the chance to do outdoor activities during the summer," and/or "Open space policies should be supported because they guarantee that people can spend their leisure time in a natural environment." In the three person control condition, each statement was attributed to a different focus group member (Jim, Mark, and John); in the repeated and single opinion conditions, one group member (Jim) made all (or one) of the statement(s).

After these manipulations, participants estimated the opinions of the focus group and New Jersey homeowners in general toward preserving open space (for both, 1 = *strongly against* and 7 = *strongly in favor*). They also estimated the percentage of New Jersey homeowners who supported preserving open space in the state (___%). Finally, participants completed a manipulation check and recalled from how many focus group members they had read opinions.

Results and Discussion

Across the studies, our primary interest was in comparing the group-level estimates made by participants who are exposed to repeated opinions from one group member to the estimates made by participants who read the same speaker advance the same opinion only once. Accordingly, our data analytic strategy was to test this central hypothesis using two orthogonal contrasts. In the studies that included both a three person control condition and a single opinion control condition, we first compared the two control conditions with each other. Second, we tested the main hypothesis by comparing the repeated condition with the single opinion control. At the end of the article, we present the results of a meta-analytic test ascertaining whether, across the relevant studies, the three person control differed significantly from the repeated condition.

Focus group opinion. As expected, participants reading three opinions in favor of open space preservation each from a different homeowner estimated more focus group support for open space preservation ($M = 6.22$, $SD = 0.89$) than did participants reading only one opinion from one homeowner ($M = 4.66$, $SD = 1.06$), $F(1, 174) = 61.98$, $p < .001$, $d = 1.60$. Of more importance, results also supported the main hypothesis. Participants who read one homeowner reiterate support for open space three times also estimated more focus group support for the issue ($M = 5.43$, $SD = 1.02$) than did participants who read the same homeowner express the same point only once, $F(1, 174) = 19.71$, $p < .001$, $d = 0.74$.

Opinion of New Jersey homeowners in general. We also examined the inferences observers drew about the opinions of New Jersey homeowners in general, the group from which the focus group was drawn. This measure allowed us to see whether there was generalization and also to rule out a possible alternative explanation, namely that observers thought that Jim's repeated comments persuaded the other group members. The two items measuring general homeowner support (favorability and percentage estimate) were conceptually similar but measured on different

scales, so we standardized them and analyzed the standardized values using a repeated-measures analysis of variance (ANOVA). Although the standardized values were used in the analyses, we report the means in terms of the original scale values below.

Results mirrored those reported above, supporting generalization and ruling out the persuasion account. As expected, observers in the three person control condition estimated more support for open space among New Jersey homeowners in general (favorability: $M = 5.35$, $SD = 1.00$; percentage: $M = 72.18\%$, $SD = 14.25\%$) than did single opinion control participants (favorability: $M = 4.57$, $SD = 1.13$; percentage: $M = 56.87\%$, $SD = 20.26\%$), $F(1, 98) = 16.45$, $p < .001$, $d = 0.83$. Consistent with our main hypothesis, participants reading one homeowner reiterate support for open space three times also estimated more widespread support for the issue among New Jersey homeowners in general (favorability: $M = 4.88$, $SD = 0.92$; percentage: $M = 65.96\%$, $SD = 15.64\%$) than did those reading the same opinion expressed only once by the same person, $F(1, 118) = 6.03$, $p < .02$, $d = 0.42$. There were no main effects or interactions of the repeated-measures factor (all $ps > .20$), confirming that the favorability and percentage measure acted similarly (see Table 1 for the means).

As discussed earlier, a memory distortion account also predicts a difference in estimates between the repeated opinion and single statement control conditions. Of the 177 participants, 137 correctly answered a manipulation check question about the number of focus group members from whom they read statements. The pattern of results and significance of all analyses remained unchanged when including only these participants, supporting the idea that memory distortion is not a necessary condition.

Study 1B: Napster CEO

An important use of focus group data is to gauge collective opinion before implementing new policies or changes in current policy. In study 1B, participants took the viewpoint of a consultant, and we assessed whether one employee expressing his opinion repeatedly would affect consultants' intentions to make a policy decision on behalf of a group of employees.

Method

Participants. Sixty students were recruited in public places on the Princeton and Rutgers University campuses to participate in a three-condition between-subjects design study (three person control, repeated opinion, single opinion control).

Procedure. The opinion issue involved the internal politics of the Internet music company Napster. Participants were told that Napster was planning to hire a new CEO and that a major issue was whether they should recruit the CEO from within or outside the company. Five Napster employees had discussed the issue in a focus group, and some of the comments made were randomly selected and printed. Participants then saw the following three opinion statements or one randomly selected opinion statement, all supporting Napster hiring a CEO from the outside: "Recruiting a CEO from outside the company ensures that they will have experience running a business," "We need a CEO from the outside to help us grow into a larger company," and/or "A CEO recruited externally can bring a fresh perspective to our business model." The comment(s) were either each attributed to a different group member (three person control) or all (one) to the same person (repeated opinion and single opinion control).

After reading the materials, participants estimated the opinions of the focus group and Napster employees in general toward recruiting an external CEO (for both, 1 = *strongly against* and 7 = *strongly in favor*) and answered the following behavioral item: "If you were a consultant employed by Napster to assist in the hiring process, how likely would you be to recommend hiring a CEO from outside the company?" (1 = *not likely* and 7 = *very likely*). Finally, they filled out a memory questionnaire asking from how many sources they had read opinions.

Results and Discussion

Focus group and general group opinion. Results replicated the general pattern found in Study 1A. Both participants in the three person control condition ($M = 5.60$, $SD = 1.10$) and the repeated opinion condition ($M = 6.05$, $SD = 0.94$) estimated that the focus group was more in favor of hiring a CEO from the outside than participants in the single opinion control condition ($M = 4.15$, $SD = 1.69$), $F(1, 57) = 12.71$, $p < .01$, $d = 1.02$; and $F(1, 57) = 21.82$, $p < .001$, $d = 1.39$, respectively. As in Study 1A, this effect generalized to the larger group from which the sample was drawn (three person control: $M = 4.85$, $SD = 1.27$; repeated opinions: $M = 4.80$, $SD = 1.36$; single opinion control: $M = 3.40$, $SD = 1.31$)—three person versus single, $F(1, 57) = 12.16$, $p < .01$, $d = 1.12$; and repeated versus single, $F(1, 57) = 11.34$, $p < .01$, $d = 1.05$.

Consultant recommendation. Results from the consultant recommendation question showed that opinion repetition also affected participants' group decision strategies. Results comparing the two control conditions showed, as expected, that observers reading three opinions each from a different employee were more likely to recommend that the company hire a CEO from the outside ($M = 4.55$, $SD = 1.61$) than were those reading one opinion from one employee advocating the same position ($M = 3.45$, $SD = 1.50$), $F(1, 57) = 5.90$, $p < .05$, $d = 0.71$. In addition and consistent with our main hypothesis, participants were also more likely to make a decision on behalf of a group when one group member had advanced that position repeatedly ($M = 4.55$, $SD = 1.15$) than they were when the same group member had expressed the same viewpoint only once, $F(1, 57) = 5.90$, $p < .05$, $d = 0.82$. Again, memory distortion did not account for the findings. The

Table 1
Study 1: Estimates of Focus Group's Opinion and New Jersey Homeowners' Opinions as a Function of Opinion Source and Number of Opinions Read

Condition	Focus group favorability	New Jersey homeowners	
		Favorability	% supporting
Single opinion control	4.66	4.57	56.87
Repeated opinions	5.43	4.88	65.96
Three person control	6.22	5.35	72.18

Note. Higher numbers on the favorability measures indicate more agreement with the opinion statements (greater favorability toward open space preservation).

pattern of results and significance of all analyses remained unchanged when including only those responding correctly to the memory questionnaire (50 out of 60 participants).

Discussion: Studies 1A and 1B

Results from Studies 1A and 1B show that an individual in a group who simply reiterates support for a particular stance can sway observers' estimates of where the group stands more than if he or she expresses the same opinion only once. Results also showed that these inferences generalize to the larger group from which the original sample was drawn and can have seemingly important policy consequences.

The Mechanism: Studies 2 and 3

The next two studies sought to establish the psychological mechanism driving this effect by distinguishing between two types of explanations, one based on metacognitive processes of opinion familiarity and the other involving conscious inferences about group dynamics and the meaning of opinion repetition in a group. Earlier, we proposed a mechanism based on opinion fluency or familiarity. Our line of reasoning was as follows. Hearing one group member repeat an opinion increases the activation of that opinion in memory. When perceivers subsequently reflect on the group's opinion—either spontaneously or when making a group-level judgment on a survey—that memory trace is cued and experienced subjectively as a feeling of fluency or familiarity for the opinion. This subjective experience, in turn, spills over into observers' group-level judgments. Although the results of Studies 1A and 1B are consistent with the familiarity model, other explanations may still apply and need to be ruled out. For instance, rather than basing their judgments on experiential information, observers instead may have made a conscious inference about the meaning of opinion repetition in a group. Observers may have reasoned that a speaker such as Jim would be less inclined to reiterate an opinion in a group setting unless he knew that the opinion was broadly shared. Thus, repeated statements made by one person may have led to more extensive group-level judgments not through opinion familiarity but through a different psychological mechanism, one similar to that emphasized by work on the spiral of silence (Noelle-Neumann, 1984). In contrast, it is worth noting that perceivers may equally plausibly assume that Jim repeats his opinion so often because he realizes that his attempts to persuade the group have not yet been successful. Hence, it is difficult to predict which inferences perceivers may draw from observed repetitions.

To avoid these ambiguities, we removed the group discussion aspect from the cover story of Study 2. Using an "instant replay" paradigm, participants either read three identical copies of the same opinion statement that had been made once by one group member or read the same opinion statement only once. If the subjective experience of opinion fluency or familiarity is sufficient to produce the effect, then simply reading the identical opinion statement over and over should lead perceivers to estimate wider group support for the position than people who have read the same opinion only once. In contrast, if the previous results reflect an assumption by perceivers that speakers only repeat their opinions when they know a group agrees, then participants' extensity judgments should be unaffected by the number of copies they have read of the same opinion statement.

Study 2: Instant Replay

Method

Participants. Undergraduates at the University of Michigan—Dearborn and University of Toledo ($N = 305$) were compensated $8 for filling out a questionnaire packet including both this study and several unrelated ones. Study 2 used a two-condition between-subjects design (duplicate statements and single opinion control).

Procedure. Participants were told that the "National Alliance Party of Belgium" (a fictitious group created for this experiment) had recently discussed the party's position on reproductive rights. Party officials had randomly e-mailed a sample of registered party members to solicit their opinions and one of the comments received was printed. Participants then saw a comment favoring a more moderate stance that was submitted via an e-mail program by a party member named Jacques Andersi. In the duplicate statements condition, the identical opinion statement was copied two more times on the bottom of the page. The materials were designed so the copies looked like an irrelevant property of the e-mail software. However, participants in this condition had to actually read the extra copies before realizing that they were identical copies of the same opinion. In contrast, those in the single statement control condition read the same opinion statement only once. Afterward, participants estimated the percentage of party members supporting the adoption of a more moderate stance, reported how many sources had made opinions, and noted whether the statements they read were identical.

Results and Discussion

Consistent with our main hypothesis, participants estimated more widespread support for a moderate stance after reading one opinion statement advocating that position three times ($M = 44.18\%$, $SD = 21.24\%$) than did participants who read the same opinion statement only once ($M = 38.26\%$, $SD = 21.07\%$), $F(1, 303) = 5.96$, $p < .05$, $d = 0.28$. Memory distortion or misreading the survey did not explain the findings. The pattern and statistical significance of the analyses remained the same when including only those participants responding correctly to both questions included in the memory questionnaire, that is, individuals who both correctly reported one speaker had expressed an opinion and correctly reported that the opinion statements were identical copies (271 out of 305 participants). These results, showing that simply reading the same opinion over and over again, even when people are aware that it is an identical copy, suggest that opinion repetition alone is sufficient to produce more extensive group-level judgments. This is consistent with an explanation involving opinion familiarity and inconsistent with the idea that an inference about the meaning of repetition in a group is necessary for the effect.

Study 3: Measuring Opinion Activation Directly

In Study 3, we sought to obtain additional convergent evidence for the psychological mechanism by measuring opinion activation directly using a lexical decision response time (RT) task. Past work

shows that perceivers are quicker to recognize words that are related to recently activated concepts than are individuals for whom the concept has not been recently brought to mind (see, e.g., Feustel, Shiffrin, & Salasoo, 1983; Haber & Hershenson, 1965). We predicted that perceivers reading repeated opinions would be quicker to recognize issue-relevant words than would be those reading only a single opinion. This is so because opinion repetition should increase the accessibility of concepts related to the topic, thus facilitating the fast recognition of related words. If opinion fluency or familiarity does significantly drive participants' group-level judgments, then observers' RTs to identifying issue-relevant words, an index of the opinion's activation, should mediate their opinion extensity judgments.

In conjunction to testing this mediational prediction, Study 3 addressed an additional alternative account for the findings. Instead of basing their judgments on their subjective experience of opinion familiarity, perceivers may have instead inferred from repeated statements that the opinion was more important or central to the group. To examine this possibility further, we asked participants to gauge the importance of the opinion to the group.

Method

Participants. A total of 196 University of Michigan undergraduates participated in a two-condition between-subjects design (repeated opinion and single opinion control) study in exchange for course credit.

Procedure. Participants arrived 1 or 2 at a time for each session and were escorted into individual rooms equipped with computers. The experimenter briefly described the lexical decision procedure and then left participants to complete the experiment by following self-guided instructions through the software program E-Prime (Psychology Software Tools, 2002). E-Prime instructed participants that they would complete a computer exercise in which letter strings would flash on the computer screen. The letter strings themselves would be either words or nonwords. They were to press the key labeled "*YES*" if the string was a word and the key marked "*NO*" if it was not a word. "*YES*" and "*NO*" labels were affixed to the "*Z*" and the "*slash*" keyboard keys, respectively. At this point, participants performed a practice exercise to familiarize them with the RT procedure. It consisted of 28 trials—14 words (e.g., *electronic*, *basket*, *chair*) and 14 nonwords. All trials began with an orienting stimulus (+) that appeared in the center of the screen for 250 ms. The letter string (word or nonword) then appeared, centered, for 50 ms. Once participants indicated word or nonword, another trial began.

Following the practice trials, the computer introduced the experimental manipulation. Participants in the repeated opinion condition read the scenario and three opinion statements in favor of preserving open space for leisure used in Study 1. Those in the single opinion control condition read the scenario and one (randomly selected) pro-open space opinion. After pressing the "*enter*" key to continue, an instruction screen then informed participants that another lexical decision task would begin. Twenty-eight letter strings were again presented in a random order. Each word or nonword was preceded by a 250-ms orienting stimulus (+). The stimuli then appeared, centered, for 50 ms.

The letter strings consisted of four target open space words (*tree*, *exercise*, *nature*, and *sports*), seven neutral words (e.g., *table*, *triangle*, *kitchen*), and 17 nonwords.[1]

After the final RT trial, the computer directed participants to a survey. They estimated the opinion toward preserving open space among focus group members and New Jersey homeowners in general (for both, 1 = *strongly against* and 7 = *strongly in favor*), estimated the percentage of New Jersey homeowners who supported open space (___%), and gauged the importance of the issue to New Jersey homeowners (1 = *not at all important* and 7 = *very important*). Participants then completed a manipulation check on the number of opinion sources.

Results

Before analyzing the RT data, we performed several preparatory steps. First, participants had judged whether each letter string was a word or nonword. Overall judgment accuracy was high (99%). Incorrect RT responses were eliminated from analyses (< 1% of the overall responses). To address issues with RT outliers, we replaced response latencies that exceeded +/– 3 standard deviations of each participant's mean RT with those values (< 2% of the responses). To control for baseline differences in RT, we computed a difference score for each participant representing the mean latency to responding correctly to the open space composite (e.g., *tree*, *exercise*, *sports*, *nature*) minus the mean latency to responding correctly to the neutral composite. Table 2 presents the RT means in milliseconds for each composite.

Open space composite. As predicted, participants reading one group member reiterate support for open space preservation three times responded more quickly to the open space words relative to the neutral words ($M_{diff} = -63.56$, $SD_{diff} = 161.69$) than did those reading the same person express the same opinion only once ($M_{diff} = -22.25$, $SD_{diff} = 115.40$), $F(1, 194) = 4.12$, $p < .05$, $d = -0.29$.

Group-level estimates. Replicating the results of Studies 1A and 1B, participants reading one homeowner repeat a pro-open space opinion three times also estimated more support for open space among the focus group ($M = 5.99$, $SD = 1.02$), more widespread support among New Jersey homeowners in general ($M = 5.09$, $SD = 0.95$), and that a greater percentage of New Jersey homeowners backed open space preservation policies ($M = 67.30\%$, $SD = 14.66\%$) than did those reading the same homeowner advocate the same position only once (focus group: $M = 5.11$, $SD = 1.16$; homeowners in general: $M = 4.59$, $SD = 1.04$; percentage supporting: $M = 60.36\%$, $SD = 15.50\%$)—focus group, $F(1, 194) = 31.90$, $p < .001$, $d = 0.81$; homeowners in

[1] Pilot participants ($N = 25$) read the open space scenario along with one of the three opinion statements and listed as many words that came to mind as possible. Four target open space words mentioned by at least 30% of the participants were identified (*tree*, *exercise*, *nature*, and *sports*) and included as materials for the study.

Table 2
Study 3: Mean Response Latencies in Milliseconds as a Function of Word Type (Issue-Relevant Words vs. Neutral Words)

Condition	Relevant words	Neutral words	Difference
One opinion	530.49	552.73	−22.25
Repeated opinions	501.78	565.34	−63.56

general, $F(1, 194) = 11.93$, $p < .01$, $d = 0.50$; and percentage estimate, $F(1, 188) = 10.03$, $p < .01$, $d = 0.46$,[2] respectively.

Mediational analysis. Our main hypothesis was that participants' experience of opinion familiarity, operationalized here as their response latency to identifying open space relevant words, would mediate their group-level judgments. We tested this mediational prediction using the z' method recommended by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002; see also Herbst, Gaertner, & Insko, 2003).[3] First, we dummy coded the number of opinions independent variable (1 = single opinion control, 2 = repeated opinions). Because it is a more sensitive measure and less likely to suffer from restricted range, we used participants' estimates of the percentage of homeowners supporting open space as the dependent variable and their RT difference score (open space words – neutral words) as the mediator.

As required by the z' method, the number of opinions participants read significantly predicted both the dependent variable (percentage estimates; $\beta = .17$, $p < .05$) and the mediator (response latencies; $\beta = -.20$, $p < .05$). That is, participants reading repeated opinions both estimated more widespread support for open space and responded more quickly to open-space-relevant words relative to neutral words than did those reading the same source express the same opinion only once. The mediator (response latency) also significantly predicted participants' percentage estimates when controlling for the effect of number of opinions read ($\beta = -.17$, $p < .05$). That is, the more quickly participants identified the open space words, the greater support for open space they estimated when controlling for experimental condition. As predicted, when participants' response latencies were controlled, the relationship between the number of opinions they read and their percentage estimates was significantly reduced ($\beta = .14$, $p > .05$). A modified Sobel test of the ratio of *ab* over the standard error of *ab* (see MacKinnon et al., 2002) confirmed that this reduction was statistically significant ($z' = 1.62$, $p < .05$). These results suggest that opinion activation or familiarity is a significant driver of the repetition effect.[4]

Opinion importance. A possibility raised earlier was that participants may have inferred opinion importance from repeated opinions. Perceivers did judge the opinion to be more important to the group after reading repeated opinions ($M = 5.02$, $SD = 1.03$) than they did after reading one opinion ($M = 4.64$, $SD = 1.10$), $F(1, 194) = 6.29$, $p < .05$, $d = 0.36$. However, perceived importance did not fully account for the repetition effect. A multivariate analysis of covariance using importance as a covariate and the three opinion prevalence estimates as dependent variables showed that the repetition effect remained significant even when covarying out importance, $F(3, 187) = 7.96$, $p < .01$. Further analyses suggested that the opinion extensity judgments may have driven participants' importance judgments rather than vice versa. When the opinion extensity measures were included as covariates, the effect of number of opinions on importance dropped to a nonsignificant level: focus group estimate as covariate, $F(1, 193) = 1.02$, $p = .31$; homeowners in general as covariate, $F(1, 193) = 1.58$, $p = .21$; and percentage estimate as covariate, $F(1, 187) = 1.58$, $p = .21$. The pattern and statistical significance of all of the group-level estimates remained the same when including only those participants responding correctly to the manipulation check (161 out of 196 participants), with the one exception that the judgments of the importance of the opinion to the group dropped to nonsignificance ($p = .07$).

Discussion: Studies 2 and 3

Results thus far show that an individual in a group who simply repeats support for a particular stance can sway observers' estimates of where the group stands on the issue more than if the same speaker had expressed the same opinion only once. Using two different paradigms, Studies 2 and 3 show convergent evidence that opinion familiarity is a significant driver of the effect. Study 2 showed that simply reading the same opinion over and over is sufficient to produce the effect. Study 3 measured opinion activation directly and showed that opinion repetition is associated with increased activation of opinion-related concepts. This activation, in turn, is itself significantly related to perceivers' group-level judgments. Although demonstrating the role of opinion familiarity, results from Studies 2 and 3 also suggest that counterexplanations involving conscious inferences about the meaning of opinion repetition in a group and opinion importance are not necessary to explain the findings.

Moderators: Studies 4 and 5

Although Studies 1A–3 show that perceivers use feelings of familiarity that were actually created by one person to make inferences about the prevalence of support for an opinion in a group, indirect evidence from the persuasion literature suggests that in some cases perceivers can and do correct their sense of opinion familiarity for source information. That is, the design of our first three studies bears resemblance to that used by Harkins and Petty (1981), which actually showed different results. Harkins and Petty were interested not in whether one source's repeated opinions influenced observers' group-level judgments but rather whether they influenced personal persuasion. Their participants

[2] Six respondents failed to report a percentage estimate, leaving 190 participants in this analysis.

[3] MacKinnon et al. (2002) empirically assessed the statistical properties of the 14 most commonly used statistical methods for establishing mediation, including Baron and Kenny's (1986) method. Their analysis concluded that the z' method was superior to the other 13 methods on the dimensions of controlling Type I error and maximizing power.

[4] Because the responses of individuals responding incorrectly to the manipulation check are ambiguous (i.e., it is unknown whether their failure to report correctly was due to misreading the form or experiencing memory distortion), the mediational analysis was conducted with only those individuals responding correctly to the manipulation check asking for the number of opinion sources (161 out of 196 participants).

either saw one fellow student make three arguments in favor of comprehensive exam requirements at their university or the same student make one argument in favor of the exams. Participants were no more persuaded by repeated arguments than by a single argument. Because they were interested in personal persuasion, Harkins and Petty did not ask their participants to estimate overall student support for the exams. However, it is conceivable that repetition did not affect their students' group-level judgments. Given that the attitudes of important reference groups often shape our personal attitudes, the observed lack of personal attitude change suggests that perceptions of the group norm may not have changed either.

A potential key difference between our studies and those of Harkins and Petty (1981) is in whether observers had previous knowledge about the group's position before reading the repeated opinions. Our participants did not have prior information about the opinions of New Jersey homeowners or Napster employees. Because perceivers in such unknown opinion situations are forming estimates of group opinion and consequently do not know whether a given opinion is counternormative or norm consistent, it may be particularly difficult for them to discount the effects of repetition. Thus, they may base their group opinion estimates largely on their subjective experience of fluency or familiarity.

In contrast, when perceivers already know a group's position, their knowledge may serve as a discounting cue. Because Harkins and Petty's (1981) students likely arrived at their study strongly suspecting that their peers opposed comprehensive exams, they may have been able to use this prior knowledge to discount repetition's influence. The idea of discounting is compatible with other research. Although people frequently draw on their subjective experiences to make inferences, discounting will occur when the informational value of their feelings is called into question by an obvious preceding event (see Schwarz, 2004, for a review). In known norm situations, then, a single person who repeats statements may not sway estimators' perceptions of the group's stance.

Study 4: Known and Unknown Norms

Study 4 tested these predictions by manipulating whether participants had or did not have prior opinion knowledge. We predicted that repeated opinions would increase perceivers' sense of the fluency or familiarity of the opinion in both situations. However, when perceivers have previous knowledge, they should question the informational value of their feelings and should attempt to correct their estimates accordingly. In contrast, when perceivers lack previous knowledge, repeated opinions should leave them with a feeling of familiarity for the opinion paired with a lack of awareness of how to correct their judgments. Thus, they should use their implicit theories that familiarity equals extensity and infer overall group support from repetition.

Method

Participants. Undergraduates ($N = 110$) participated in a "Questionnaire Day" during three separate testing sessions at Harvard University. Materials for this study were embedded in a larger questionnaire packet for which participants were paid \$8–\$20, depending on the length of the packet. Study 4 was a 2 (previous knowledge: known opinion vs. unknown opinion) × 2 (number of opinions: one vs. repeated) between-subjects factorial design.

Procedure. The opinion topic was a modified version of that used in Study 2. Participants either read one person reiterate an opinion that a specific political party should adopt a more moderate stance on the reproductive rights issue three times (repeated statement condition) or read the same person advocate the same position once (single opinion control condition). In the known opinion condition, the opinion statement(s) were attributed to a member of the Republican Party. We picked the Republican Party because most undergraduates know that a moderate stance on reproductive rights is a counternormative position. In the unknown opinion condition, the statement(s) were attributed to a member of the "National Alliance Political Party of Belgium," a fictitious group created for this experiment and thus one about which no prior opinion knowledge could have existed.

Participants read that there had been a lot of discussion lately in the Republican (National Alliance) Party about the party's position on the issue. Party officials had randomly e-mailed a sample of registered party members, and some of the comments received were printed. Participants then saw the following three opinions or one randomly selected opinion, all designed to be slight variations on the same argument: "We are losing votes because of our inflexibility on the abortion issue. I think the party would benefit if we became more moderate in our position," "Fewer people are voting with us because of our lack of flexibility on the abortion question. I think the party would be helped if we became more moderate in our stance," and/or "Not as many people are voting with us because we are not flexible on the abortion issue. I think the party would profit from a more moderate position." The statement(s) were attributed to either Jim Anderson (Republican) or Jacques Andersi (National Alliance).

Participants then estimated the opinion of the random sample, the opinion of party members in general (for both, 1 = *strongly against* and 7 = *strongly in favor*), and the percentage of party members supporting the adoption of a more moderate stance (___%). Participants then filled out a manipulation check on the number of opinion sources.

Results

Opinion of random sample. A 2 × 2 ANOVA on participants' estimates of the random sample's opinion showed a significant main effect for number of opinions, $F(1, 106) = 19.84$, $p < .001$. Collapsing across previous knowledge, participants reading repeated opinions estimated more support for a moderate position ($M = 5.58$, $SD = 1.39$) than did participants reading only one opinion from the same person ($M = 4.37$, $SD = 1.45$). No other effects approached significance.

Opinion of party members in general. The variables measuring overall party opinion (favorability and percentage estimate) were conceptually similar but measured on different scales: They were standardized and analyzed using a repeated-measures ANOVA. One participant failed to report a percentage estimate and was not included in this analysis. Although the analyses were performed with the standardized scores, we report the means for the individual items below. A 2 × 2 × 2 mixed-model ANOVA using the number of opinions and previous knowledge variables as between-subjects factors and the two group estimate variables as a

within-subjects factor revealed significant main effects for both number of opinions, $F(1, 105) = 7.59$, $p < .01$, and previous knowledge, $F(1, 105) = 24.54$, $p < .01$. However, these main effects were qualified by the predicted Number of Opinions × Previous Knowledge interaction, $F(1, 105) = 10.79$, $p < .01$.

Two follow-up comparisons were conducted to determine the nature of the interaction. As predicted, when participants did not have previous knowledge about where the group stood on the issue (e.g., National Alliance Party), their group-level judgments were affected by the number of opinions they read. Observers reading one party member repeatedly advocate a moderate position estimated more group-level support for that viewpoint (favorability: $M = 4.68$, $SD = 1.25$; percentage: $M = 62.80\%$, $SD = 17.94\%$) than did those reading the same person express the same position only once (favorability: $M = 3.96$, $SD = 1.07$; percentage: $M = 42.66\%$, $SD = 17.76\%$), $F(1, 51) = 15.37$, $p < .001$, $d = 1.08$. In contrast and also as predicted, when participants had prior knowledge of the opinion (Republican Party), they were able to correct their judgments and their group-level estimates were not affected by the number of opinion expressions they read. Observers estimated a similar amount of support for a moderate position regardless of whether they read repeated opinions from one source (favorability: $M = 3.50$, $SD = 1.14$; percentage: $M = 39.26\%$, $SD = 14.72\%$) or only one opinion from the same person (favorability: $M = 3.37$, $SD = 1.32$; percentage: $M = 42.97\%$, $SD = 19.09\%$), $F(1, 54) = 0.17$, $p = .68$, $d = -0.04$ (see Table 3 for the pattern of means). It is important to note that there were no main effects or interactions of the repeated-measures factor (all ps $> .10$), confirming that the favorability and percentage measures acted similarly, and the pattern of data and significance of the analyses reported remained the same even when retaining only those participants who responded correctly to the memory questionnaire (87 out of 110 participants).

Study 5: Known Opinions and Time Delay

Study 4 showed that observers who were in the know about a group's opinion corrected their sense of opinion familiarity with source information. This may suggest that the repetition effect only holds when people are forming estimates of group opinion but not when they are changing group-level impressions. However, some work on familiarity and judgment suggests that people's ability to discount their feelings of familiarity may be short lived. If people's group-level judgments are driven by their feelings of familiarity, then under some conditions the repetition effect should emerge in known norm situations as well.

Table 3
Study 4: The Effects of Prior Opinion Knowledge and Number of Opinions Read on Estimates of Party Favorability and Percentage of Party Members Supporting a More Moderate Stance

	Known opinion		Unknown opinion	
Condition	Favorability	%	Favorability	%
Single opinion control	3.37	42.97	3.96	42.66
Repeated opinions	3.50	39.26	4.68	62.80

Note. Higher numbers on the favorability measures indicate more agreement with the opinion statements (greater favorability toward the issue).

Although research shows that people are initially reluctant to use familiarity in their judgments when its diagnosticity is called into question, it can spill over into observers' judgments when the cause of the familiarity becomes less obvious. Jacoby et al. (1989), for instance, had participants read a list of nonfamous names (e.g., *Sebastian Weisdorf*). Participants then made fame judgments of names on a second list, some of which were from the first list and some of which were new. When participants saw the second list immediately after the first, familiarity information did not influence their fame judgments. This is because participants knew the names felt familiar only because they had just read them for the experiment. However, after a 24-hr time delay participants showed a "false fame effect," attributing fame at Time 2 to names they had studied at Time 1. The time delay preserved participants' feeling of familiarity for the names but diminished their source memory for why they seemed familiar. This prediction is akin to a sleeper effect (see, e.g., Hovland & Weiss, 1951; Pratkanis, Greenwald, Leippe, & Baumgardner, 1988).

We hypothesize that a similar process may occur here. Initially, perceivers with prior opinion knowledge may be able to subtract the effect of repetition from their judgments. However, this ability may be short lived. After a time delay, observers will be left with a feeling of familiarity for the opinion but impaired conscious memory for its source. As a consequence, following a time delay even perceivers with previous opinion knowledge may show the repetition effect.

Method

Participants. A total of 196 Princeton University students participated. One group ($n = 169$) was compensated $8 for completing this study along with several unrelated ones as part of a "Questionnaire Day" packet sponsored by the Psychology Department. The remaining 27 students completed the study in exchange for credit in their psychology laboratory course. The study used a 3 (number of opinions: three person control, repeated opinion, and single opinion control) × 2 (time delay: delay or no delay) between-subjects factorial design.[5]

Procedure. The university where the study was conducted does not have professional schools, such as a law or business school. The norm on campus is against establishing professional schools and in favor of keeping the liberal arts tradition. Students were told that there had been recent discussion of the professional school issue on campus, that undergraduate opinions had been solicited and posted on a bulletin board discussion group, and that some of the comments submitted had been printed.

Participants then either saw the following three opinion statements or one randomly selected opinion statement, all favoring adopting professional schools to compete with "peer institutions:" "Princeton needs to establish professional schools to compete

[5] The students completing the study in exchange for course credit completed the study under delay conditions and were either assigned to the single statement control or repeated condition. Analyses revealed no significant main effects or interactions of study type (paid vs. course credit) in any of the analyses with any of the dependent variables, so this variable is not discussed further.

more aggressively with peer institutions in the future," "Professional schools will make Princeton more competitive with Harvard and Yale and will enable us to flourish," and/or "Success in the future requires that Princeton establish professional schools to contend with other universities." The opinions were either each attributed to a different student (three person control) or to the same person (repeated opinion and single opinion control conditions).

After the manipulations, participants in the no time delay condition filled out the dependent variables. Time delay participants first read an unrelated scientific news article that took approximately 5 min to read. Participants then estimated the opinions of the bulletin board and the students in general toward the issue (for both, 1 = *strongly oppose professional schools* and 7 = *strongly favor professional schools*).

Results and Discussion

Bulletin board opinion. Following the data analytic strategy used in the earlier studies to first compare the two control conditions with each other and then to compare the repeated condition with the single opinion control, we used two separate 2 × 2 ANOVAs to test these predictions. The first 2 × 2 analysis compared the three person control condition with the single opinion control across the two levels of time delay (no delay vs. delay). The second 2 × 2 analysis compared the repeated opinions condition with the single opinion control condition across the two levels of time delay. Both analyses using estimates of the bulletin board's opinion revealed main effects for number of opinions. Specifically, participants in the three person control condition ($M = 6.71$, $SD = 0.53$) estimated that the bulletin board members supported professional schools more than did those in the single statement control ($M = 5.19$, $SD = 1.35$), $F(1, 190) = 52.79$, $p < .01$. In addition, participants reading repeated statements also estimated more bulletin board support for the issue ($M = 5.69$, $SD = 1.37$) than did those reading a single opinion, $F(1, 190) = 5.91$, $p < .05$. No other effects were significant.

Overall student opinion. Because a known norm was used in this study, we predicted that participants would initially be able to use their prior knowledge about the norm to discount the effects of repetition from their judgments of overall student support for the issue. In contrast, we predicted that after a time delay, students would be left with a heightened feeling of familiarity for the opinion but its source would be less obvious. As a consequence, we predicted that time delay participants would use their feelings of familiarity for the opinion to judge group-level support for the issue. The first 2 × 2 analysis, comparing the estimates of overall student support made by participants in the three person control condition with the estimates made by those in the single opinion control condition, revealed a significant main effect for number of opinions, $F(1, 190) = 7.51$, $p < .01$, and a nonsignificant effect for time delay, $F(1, 190) = 0.83$, $p > .05$. These effects were qualified by the predicted Number of Opinions × Time Delay interaction, $F(1, 190) = 4.67$, $p < .05$. Follow-up planned contrasts were conducted to explore the pattern of the interaction. As predicted, when there was no time delay students estimated a similar amount of group support for professional schools regardless of whether they read three favorable statements from three different people ($M = 3.96$, $SD = 1.26$) or one favorable statement from one person ($M = 3.83$, $SD = 1.37$), $F(1, 190) = 0.16$, $p > .05$, $d = 0.10$. In contrast and also as predicted, after a time delay, participants reading three pro-professional school opinions from three different sources estimated greater overall student support ($M = 4.66$, $SD = 1.10$) than did those reading only one opinion from one person ($M = 3.55$, $SD = 1.06$), $F(1, 190) = 12.84$, $p < .01$, $d = 1.03$.

A second 2 × 2 ANOVA tested the main hypothesis by comparing the group-level estimates made by those in the repeated opinion condition with the estimates made by those in the single opinion control condition across the two levels of time delay. Analyses revealed no significant main effects for either number of opinions, $F(1, 190) = 1.17$, $p = .28$, or time delay, $F(1, 190) = 1.94$, $p = .17$. However, as predicted, there was a significant interaction between these variables, $F(1, 190) = 7.33$, $p < .01$. Follow-up planned contrasts revealed that when there was no time delay, participants' group-level estimates did not differ, regardless of whether they had read one fellow student expressing the opinion repeatedly ($M = 3.48$, $SD = 1.18$) or the same student express the same opinion only once ($M = 3.83$, $SD = 1.37$), $F(1, 190) = 1.14$, $p = .28$, $d = -0.27$. However, supporting our main prediction, after a time delay, participants who had read one fellow student reiterate support for professional schools three times estimated more group-level support for the issue ($M = 4.37$, $SD = 1.48$) than did those who read the same source express the same position only once ($M = 3.55$, $SD = 1.06$), $F(1, 190) = 8.51$, $p < .05$, $d = 0.64$. Please see Figure 1 for the results. These results show that people who have prior knowledge about where a group stands on an issue are initially able to discount the effects of repetition from their judgments. However, after a time delay, repeated individual-level information spills over into group-level judgments even when perceivers are making judgments about known opinions.

Discussion: Studies 4 and 5

Studies 4 and 5 show that observers with prior knowledge of a group's opinion are initially hesitant to use the heightened feelings of fluency or familiarity created by one source's repeated counternormative statements to judge the extent of support for the opinion in the group. They use their prior knowledge as a discounting cue. However, when a time delay obscures the linkage between their amplified feeling of familiarity and its source, individuals' ability to appropriately integrate the number of times they have heard an opinion expressed and the number of people expressing the opinion is compromised even in known norm situations. These results both address the moderating role of prior opinion knowledge in the repetition effect and buttress Studies 2 and 3 by providing additional convergent support for the familiarity model. That is, if the repetition effect were driven by something other than perceivers' subjective experiences, such as people's conscious inferences about why a speaker in a group setting would express an opinion multiple times or perceivers' conscious inferences that only important opinions are expressed repeatedly, then we would expect that the effect would have also emerged without a time delay. Instead, the results support the idea that people are initially able to discount their subjective experience of opinion familiarity. However, once the source of the heightened sense of

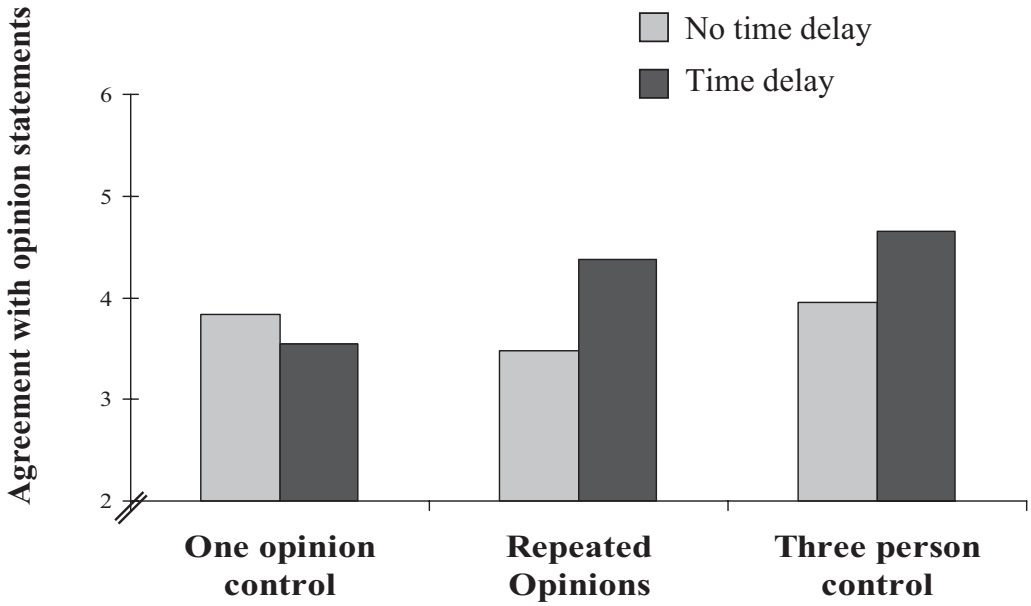

Figure 1. Study 5: The effects of time delay and number of opinions on estimates of general student support for professional schools. Higher numbers indicate more agreement with the opinion statements (greater favorability toward professional schools).

familiarity becomes less obvious, people's feelings do spill over into their group-level judgments.[6]

General Discussion

What we think others think greatly influences our own personal thoughts, feelings, and behavior. Our accuracy in forming impressions of group opinion and group norms is also an essential component in guiding our social interactions. Nevertheless, little is known about how we estimate the prevalence of an opinion in a group. Quite obviously, an opinion is likely to be more widely shared the more different group members express it. Our participants clearly recognized this and provided higher prevalence estimates when the same opinion was expressed once by each of three different group members than when it was expressed once by one group member. More surprising, and consistent with our hypotheses, however, our studies showed that hearing one person express an opinion repeatedly also leads perceivers to estimate that the opinion is more widespread relative to hearing the same communicator express the same opinion only once. Across our studies, we found that although three people each expressing the same sentiment is more influential than one person expressing the same belief three times, the latter was, on average, 90% of the former.[7]

The Underlying Process

We also sought to understand the processes driving the repetition effect by distinguishing between two types of mechanisms, one based on metacognitive experiences and the other based on conscious inferences that perceivers may make about group dynamics and the meaning of repetition in a group. Drawing on past research of metacognitive experiences in human judgment (for a review, see Schwarz, 2004), we proposed that repeated exposure to an opinion increases the accessibility of the opinion in memory and results in a feeling of familiarity when the opinion is encountered again, such as through spontaneous reflection or as part of a question about its prevalence. This subjective experience leaves perceivers with the (correct) impression that they have heard this opinion many times. In our daily lives, we are likely to hear an opinion many times when it is offered by different people in different situations. We predicted that people overapply this usually correct assumption and infer extensity from familiarity even under conditions in which the opinion is repeatedly offered by the same single individual. Our results consistently support this prediction.

As theoretically expected, the observed effect can be traced to the increased accessibility of the opinion and related concepts. Opinion repetition facilitates fast responses to issue-relevant words on a lexical decision task (Study 3). This increased opinion accessibility, in turn, mediates the influence of opinion repetition on perceivers' extensity judgments. In contrast, we obtained no sup-

[6] It is interesting to note that the work of Linville and colleagues (Linville & Fischer, 1993; Linville, Fischer, & Salovey, 1989) shows that increasing familiarity with the individual members of a group can increase perceivers' sense of the heterogeneity of opinions in the group, whereas our work suggests that increased familiarity with one particular group member's position leads to a decrease in perceivers' estimates of opinion heterogeneity.

[7] A meta-analysis of the results for the three studies using the three person control condition (Studies 1A, 1B, and 5) showed that, as would be logically expected, hearing three different people each advance an opinion leads observers to attribute greater group-level support for the issue than does hearing one group member repeat the same opinion three times, $z(9) = 5.42$, $p < .001$.

port for the idea that perceivers' inferences are based on the assumption that speakers may only repeat their opinions when they believe them to be widely shared in the group. Instead, opinion repetition has the same effect on extensity judgments when it occurs outside a group setting (Study 2). Studies 4 and 5 provide final convergent evidence in favor of a mechanism based on subjective experiences by adding a time delay. When individuals had prior knowledge about the prevalence of an opinion, they initially corrected their judgments and only demonstrated the repetition effect after a time delay. This is consistent with a subjective experiences account and contrary to a mechanism based on inferences about group dynamics and the meaning of opinion repetition in a group, which would predict that opinion repetition should have the same influence on judgments regardless of whether there is a time delay between reading the opinions and estimating the opinion's prevalence.

Limitations and Future Directions

Although the current research clearly implicates participants' subjective experiences as a significant driver of the effect, methodological issues make it difficult to directly assess the specific construct of familiarity in a nonreactive and valid way. For instance, consider order effects. Asking participants first to report how familiar an opinion seems to them and then to make their prevalence estimates will likely focus their attention on source information, which may lead them to discount their subjective experiences when making the prevalence judgments. On the other hand, asking participants first to make a prevalence estimate and then to report how familiar the opinion seems may produce a biased assessment of familiarity. Once participants have judged a larger percentage of the group to be in favor of an issue, they may feel pressure to justify their judgments by stating that the opinion feels more familiar. These issues of reactivity and validity make it necessary to use indirect measures, such as lexical decision tasks and time delay, to assess the role of metacognitive processes in producing the effect. Given the converging results from our indirect measures paired with the well-established evidence that people attribute processing ease (brought about by stimulus repetition or other fluency-enhancing variables) to familiarity (e.g., Begg, Anas, & Farinacci, 1992; Jacoby et al., 1989; Jacoby & Whitehouse, 1989; Johnson, Dark, & Jacoby, 1985; Whittlesea, Jacoby, & Girard, 1990), we believe that opinion familiarity is a significant driver of the repetition effect observed here. At the same time, a useful avenue for future research would be to attempt to measure familiarity more directly in a less reactive way. Misattribution manipulations, which involve giving respondents a plausible alternative explanation for the subjective experience of familiarity, would be informative in this regard.

Implications for Theory and Practice

On a theoretical level, this work contributes to our knowledge of how people construct estimates of group norms or collective sentiment. Although the study of social influence has been a central and fruitful topic of inquiry in social psychology, past research attention has focused almost exclusively on the consequences of social norms, that is, how people respond to group norms that are either readily apparent by virtue of being directly manipulated in laboratory or naturalistic settings (e.g., Asch, 1951; Cialdini, Kallgren, & Reno, 1991) or norms that are subjectively construed and assessed by self-reports (Fishbein & Ajzen, 1972; Terry & Hogg, 1996). This work has generated many substantial and important discoveries, and clearly some important research questions can only be answered by holding people's normative perceptions constant or by tapping into what individual perceivers actually believe the norm to be. At the same time, however, this focus has left largely unanswered the antecedent and potentially equally important question of how people actually come to identify norms in the first place (Prentice & Miller, 1993). The importance of learning more about the actual construction process is underscored by work on pluralistic ignorance, which shows that in many real world settings, people err in their normative estimates and act on misidentified norms (Korte, 1972; Prentice & Miller, 1993; Shelton & Richeson, 2005). The current studies have begun to fill this gap by investigating the role of people's subjective experiences in the construction of group-level judgments.

On a practical level, the model we proposed has important implications for how people may come to estimate collective sentiment in everyday settings. Perceivers are frequently confronted with situations in which they are forced to estimate how members of a group feel about an issue while having only partial information about the attitudes of the group members. Congressmen, for instance, may get phone calls from a small number of constituents requesting a certain policy be implemented or changed and from those requests must decide how voters in their state feel about the issue. Adding complexity, some investigators have suggested that people who espouse particular sides of an issue, such as positions that reflect traditional group values, may feel licensed to be more prominent and vocal than others (Korte, 1972; Newcomb, 1943; Noelle-Neumann, 1984). If perceivers base their group-level judgments on feelings of familiarity, then situations can arise in which people come to believe that the norm is extreme in one direction whereas a silent majority may actually feel otherwise (Korte, 1972).

Future research should investigate more closely the consequences that can arise from misperceiving norms in social contexts—that is, once individuals misperceive group norms as a result of repeated expressions from one person or a small minority of individuals, will this instigate a misguided social influence process? Preliminary results from our laboratory indicate that opinion repetition from one source can lead individuals to change their own attitude toward an issue (Weaver & Schwarz, 2005). Future research should explore this important question in more detail.

In summary, the present studies convey an important message about how people construct estimates of group opinion, namely that observers appear to infer information about extensity, or the range of group members supporting an issue, from their subjective experiences of familiarity for an opinion position. To the degree that our impressions of what others think influence our own perceptions of reality, the present studies can help inform us about the repetition effect and its consequences.

References

Asch, S. E. (1951). Effects of group pressure upon the modification and distortion of judgments. In H. Guetzkow (Ed.), *Groups, leadership, and men* (pp. 177–190). Pittsburgh, PA: Carnegie Press.

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

Begg, I. M., Anas, A., & Farinacci, S. (1992). Dissociation of processes in belief: Source recollection, statement familiarity, and the illusion of truth. *Journal of Experimental Psychology: General, 121,* 446–458.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). The focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 24, pp. 201–234). San Diego, CA: Academic.

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology, 51,* 629–636.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7,* 123–146.

Feustel, T. C., Shiffrin, R. M., & Salasoo, A. (1983). Episodic and lexical contributions to the repetition effect in word identification. *Journal of Experimental Psychology: General, 112,* 309–346.

Fishbein, M., & Ajzen, I. (1972). Attitudes and opinions. *Annual Review of Psychology, 23,* 487–544.

Haber, R. N., & Hershenson, M. (1965). The effects of repeated brief exposures on growth of a percept. *Journal of Experimental Psychology, 69,* 40–46.

Hamill, R., Wilson, T. D., & Nisbett, R. E. (1980). Insensitivity to sample bias: Generalizing from atypical cases. *Journal of Personality and Social Psychology, 39,* 578–589.

Harkins, S. G., & Petty, R. E. (1981). Effects of source magnification of cognitive effort on attitudes: An information-processing view. *Journal of Personality and Social Psychology, 40,* 401–413.

Hasher, L., Goldstein, D., & Toppino, T. (1977). Frequency and the conference of validity. *Journal of Verbal Learning and Verbal Behavior, 16,* 107–112.

Hastie, R., & Park, B. (1986). The relationship between memory and judgment depends on whether the judgment task is memory-based or on-line. *Psychological Review, 93,* 258–268.

Herbst, K. C., Gaertner, L., & Insko, C. A. (2003). My head says yes but my heart says no: Cognitive and affective attraction as a function of similarity to the ideal self. *Journal of Personality and Social Psychology, 84,* 1206–1219.

Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public Opinion Quarterly, 15,* 635–650.

Jacoby, L. L., Kelley, C., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid conscious influences of the past. *Journal of Personality and Social Psychology, 56,* 326–338.

Jacoby, L. L., & Whitehouse, K. (1989). An illusion of memory: False recognition influenced by unconscious perception. *Journal of Experimental Psychology: General, 118,* 126–135.

Johnson, W. A., Dark, V. J., & Jacoby, L. L. (1985). Perceptual fluency and recognition judgments. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11,* 3–11.

Kelley, C. M., & Rhodes, M. G. (2002). Making sense and nonsense of experience: Attributions in memory and judgment. *Psychology of Learning and Motivation, 41,* 293–320.

Korte, C. (1972). Pluralistic ignorance about student radicalism. *Sociometry, 35,* 576–587.

Linville, P. W., & Fischer, G. W. (1993). Exemplar memory and property abstraction processes in perceived distributions of in-group and out-group members. *Social Cognition, 11,* 92–125.

Linville, P. W., Fischer, G. W., & Salovey, P. (1989). Perceived distributions of the characteristics of ingroup and outgroup members. *Journal of Personality and Social Psychology, 57,* 165–188.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7,* 83–104.

McFarland, C., & Miller, D. T. (1990). Judgments of self-other similarity: Just like other people only more so. *Personality and Social Psychology Bulletin, 16,* 475–484.

McGlone, M. S., & Tofighbakhsh, J. (2000). Birds of a feather flock conjointly? Rhyme as reason in aphorisms. *Psychological Science, 11,* 424–428.

Miller, D. T., & Prentice, D. A. (1996). The construction of social norms and standards. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 799–829). New York: Guilford.

Moscovici, S. (1985). Social influence and conformity. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology* (Vol. 2, pp. 347–412). New York: Random House.

Newcomb, T. M. (1943). *Personality and social change.* New York: Holt, Rhinehart & Winston.

Noelle-Neumann, E. (1984). *The spiral of silence: Our social skin.* Chicago: University of Chicago Press.

Pratkanis, A. R., Greenwald, A. G., Leippe, M. R., & Baumgardner, M. H. (1988). In search of reliable persuasion effects III: The sleeper effect is dead. Long live the sleeper effect. *Journal of Personality and Social Psychology, 54,* 203–218.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology, 64,* 243–256.

Psychology Software Tools. (2002). E-Prime (Version 1.2) [Computer software]. Pittsburgh, PA: Author.

Quattrone, G. A., & Jones, E. E. (1980). The perception of variability within in-groups and out-groups: Implications for the law of small numbers. *Journal of Personality and Social Psychology, 38,* 141–152.

Reber, R., & Schwarz, N. (1999). Effects of perceptual fluency on judgments of truth. *Consciousness and Cognition: An International Journal, 8,* 338–342.

Rothbart, M., Fulero, S., Jensen, C., Howard, J., & Birrell, P. (1978). From individual to group impressions: Availability heuristics in stereotyping formation. *Journal of Experimental Social Psychology, 14,* 237–255.

Schwarz, N. (2004). Meta-cognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology, 14,* 332–348.

Shelton, J. N., & Richeson, J. A. (2005). Intergroup contact and pluralistic ignorance. *Journal of Personality and Social Psychology, 31,* 1189–1202.

Sherif, M. (1936). *The psychology of social norms.* New York: McGraw-Hill.

Skurnik, I., Yoon, C., Park, D. C., & Schwarz, N. (2005). How warnings about false claims become recommendations. *Journal of Consumer Research, 31,* 713–724.

Terry, D. J., & Hogg, M. A. (1996). Group norms and the attitude–behavior relationship: A role for group identification. *Personality and Social Psychology Bulletin, 22,* 776–793.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5,* 207–232.

Weaver, K., & Schwarz, N. (2005). *Using social influence to change health behavior.* Unpublished manuscript, University of Michigan.

Whittlesea, B. W. A., Jacoby, L. L., & Girard, K. (1990). Illusions of immediate memory: Evidence of an attributional basis for feelings of familiarity and perceptual quality. *Journal of Memory and Language, 29,* 716–732.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology Monographs, 9,* 1–27.

Received January 17, 2003
Revision received July 29, 2006
Accepted August 18, 2006 ■