

Judgmental Biases Resulting From Differing Availabilities of Arguments

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This experiment tested the hypothesis that information which is disproportionately available in memory will have a correspondingly disproportionate impact on evaluative judgments. In a mock jury decision, the availability of selected information in memory was varied according to the relative vividness of the evidence (prosecution evidence more vivid or defense evidence more vivid) and the favorableness of the defendant ("good guy" or "bad guy"). Subjects judged the defendant's guilt immediately and after 48 hours; in addition, they recalled the evidence after the 48-hour interval. Subjects recalled more vivid evidence and more evidence that disagreed with the defendant's favorableness. Their judgments of apparent guilt paralleled their differential recall of the prosecution and defense evidence. These availability differences occurred only after the retention interval and did not affect judgments given immediately after reading the arguments. The results support a model in which judgments are based on the availability and the diagnosticity of the information.

People often draw social inferences and render social judgments on the basis of relevant information they can recall from memory. Having known John for many years, we may unexpectedly be asked by an adoption agency whether he would make a good father. To decide, we may search our historical knowledge of John for evidence both consistent and inconsistent with our conception of a good father. Does John like children? Does he interact well with them? In answering such questions, we recall a sample of facts from the population of potentially recallable facts relevant to assessing John's fatherhood potential. Having recalled a sample of relevant facts, we use these, perhaps in some Bayesian weighting scheme, to decide whether or not John would be a good father.

If our current judgments are based on those

relevant facts available in memory, then judgments should be disproportionately influenced by facts easily recalled and relatively uninfluenced by facts that are difficult or impossible to recall at the time the judgment is made. Therefore, the ultimate weight of a fact in promoting a given judgment (e.g., that John would be a good father) would increase with its memorability as well as its diagnostic value for the judgment in question. Following Tversky and Kahneman (1973), we will call this the *availability heuristic* for social judgments calculated from memory. Tversky and Kahneman proposed that people judge the frequency or relative likelihood of a given class of events (e.g., the proportion of hearts played in preceding bridge hands) according to the ease with which such events come to mind. This rule of thumb is a heuristic in that it shortcuts the lengthier procedure of exhaustively recalling a large sample of events and then calculating proportions. Since more frequent events are typically recalled more readily, the heuristic yields unbiased estimates of likelihoods if the events are equally memorable. But if due to extraneous factors the events differ in their memorability or retrievability, the heuristic overestimates the likeli-

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hood of the more available event and underestimates the less available event. For example, subjects in Experiment 8 of Tversky and Kahneman (1973), after reading a list of famous names and lesser-known names, found the famous names easier to recall and overestimated the proportion of famous names on the list.

Whereas Tversky and Kahneman addressed only people's estimates of event likelihoods, we wished to apply the availability heuristic to social judgments in general. Social judgments calculated from memory should be biased in the direction of relevant information that is highly available in memory. Relevant information that is difficult to remember should have less impact on a judgment than is justified by its evidential value, whereas relevant information that is easy to remember should have a greater impact. Thus, any factor that influences the memorability or retrievability of given evidence should influence the impact of that evidence on a later decision made from memory.

A likely variable affecting the availability of information is its concreteness or vividness. Words or phrases that are concrete and evoke vivid imagery are better remembered than abstract, pallid words in practically all verbal learning experiments (for review, see Paivio, 1971). Also, sentences composed of concrete words are better remembered than abstract sentences (Begg & Paivio, 1969; Holmes & Langford, 1976). Whether this vividness effect is due to dual coding (verbal and imaginal) or differential elaboration (see Anderson, 1976) is of no concern here; we merely accept the fact that vivid information is usually better remembered and proceed to use it for testing our hypothesis. We predict that given opposing arguments of equal persuasiveness regarding some issue, the person's judgment after a retention interval will be disproportionately influenced by the more vivid arguments, since they will be more available in memory.

To test this hypothesis, we had subjects read a series of legal arguments from a jury trial (although this was not a close simulation of a trial). The defendant was being tried on a drunk driving charge. Each argument could

be presented in either a vivid or nonvivid form by varying the elaboration and concreteness of the details. Half of the subjects read vivid prosecution arguments along with nonvivid defense arguments, whereas the others read the reverse. Assuming that the probative values of the two forms of evidence are equal, then in an immediate test the two groups should not differ in judgments of the defendant's apparent guilt. However, after a retention interval, the more vivid arguments should be more available for recall and hence they should dominate the nonvivid counterarguments in determining guilt judgments.

Another variable in this experiment was the favorableness ("good guy" vs. "bad guy") of the defendant as described before the arguments were presented. For half of the subjects, the defendant was initially described as "warm and friendly," whereas for the others he was described as "cold and unfriendly." The existing literature is conflicting on what to expect for recall of favorable versus unfavorable information about a person towards whom we hold an initial favorable or unfavorable attitude. One class of hypotheses, with attendant results, suggests that congruent information will be more readily assimilated, learned, and recalled than incongruent information (e.g., Cantor & Mischel, 1977; Hamilton & Gifford, 1976; Zadny & Gerard, 1974). Such hypotheses are often stated in terms of "schema applying mechanisms," wherein stereotypes produce expectations and assimilate new information. An alternate class of hypotheses, and set of data, suggests that information incongruent with an initial belief will attract more attention, deeper processing, and hence be better remembered than expected congruent information (e.g., Hastie & Kumar, 1979). Such results are often explained by reference to the surprisingness of the incongruent information (von Restorff effects in memory) or the apparent need to "explain it away" by explanatory elaborations that cause it to be better remembered (see also Hastie, *in press*). We were curious what would happen with our jury trial simulation. Our intuitions were that judges would be far more sympathetic to and supportive of the "warm, friendly" defendant and thus would better re-

member evidence cited in his favor and judge him as less guilty than the "cold, unfriendly" defendant.

Method

Subjects

Fifty-four introductory psychology students at Stanford University participated in groups (of two to eight people) in two 30-minute sessions conducted 48 hours apart. The subjects were paid or given course credit on completion of the second session. Seven subjects, evenly distributed across experimental conditions, failed to appear for the second session. Their data are included in the statistics for the first session.

Procedure

Session 1. On arriving for an experiment on "judgment" processes, each subject received a booklet with instructions and a description of a court case involving drunk driving. After reading the instructions, subjects read a background information section of 150 words describing the events leading to the defendant's arrest. The defendant, while driving home from a Christmas party, had run a stop sign and collided with a garbage truck. No determination of the defendant's blood alcohol level had been made at the time, but he had been arrested and was now being tried for drunk driving on the basis of the circumstantial evidence. The defense argued that he was not legally drunk, so the severity of the crime would be lessened.

Subjects next read a one-paragraph description of the defendant. For some of the subjects, the defendant was depicted as a married "thirty-five-year-old veterinarian" described by his customers as a "warm, friendly person" (good guy condition, $n = 26$). For the other subjects, the defendant was depicted as a divorced "thirty-five-year-old longshoreman" described by his fellow workers as a "cold, unfriendly person" (bad guy condition, $n = 28$). The two defendants were given identical records of traffic violations. Subjects were randomly assigned to a condition.

Next, subjects read, at their own pace, 18 brief summaries of evidence ("arguments" presented in the trial). For purposes of recall scoring, each argument had one basic evidentiary idea and was about 22 content words long. Half of the arguments implied that the defendant was guilty of drunk driving and were identified in the booklet as evidence for the prosecution; the other half implied that the defendant was not guilty of drunk driving and were identified as evidence for the defense.

Each argument had both a vivid version and a pallid version. These expressed the same basic evidentiary idea but with differing levels of specificity and elaboration. For example, one argument (im-

plying that the defendant was drunk shortly before leaving the party) had this pallid version: "On his way out the door, Sanders [the defendant] staggered against a serving table, knocking a bowl to the floor." The vivid version stated: "On his way out the door, Sanders staggered against a serving table, knocking a bowl of guacamole dip to the floor and splattering guacamole on the white shag carpet." Another argument (implying that the defendant was not drunk) had this pallid version: "The owner of the garbage truck admitted under cross-examination that his garbage truck is difficult to see at night because it is grey in color." The vivid version restated this evidence but added the line: "The owner said, 'his trucks are grey 'Because it hides the dirt,' and he said, 'What do you want, I should paint them pink?'" The arguments were designed so that the differences between the vivid and pallid versions did not affect the probative value of the evidence. We wished to demonstrate effects of argument availability independent of its probative value. But to unconfound these two factors, we were forced to make the vividness manipulation relatively slight, by merely adding a vivid but irrelevant detail or embellishment to the description of what was already an imageable event (all evidence consisted of descriptions of concrete events). A more dramatic variation in vividness appeared to alter the immediate subjective impact of the arguments, which was not the point at issue. So the relatively slight manipulation was chosen for design purposes.

Each subject read, in exactly the same sequence, nine prosecution arguments and nine defense arguments (one per page) in alternating order. Within each defendant condition (good or bad), some of the subjects read the vivid versions of the prosecution evidence and the pallid versions of the defense evidence (vivid prosecution condition, $n = 28$), and the others read the vivid versions of the defense evidence and the pallid versions of the prosecution evidence (vivid defense condition, $n = 26$). Again, subjects were randomly assigned to a condition.

After reading the arguments, the subjects were given all 18 arguments for a second time and instructed to rate the importance of each argument on a 101-point scale anchored at "strong support for the prosecution" (0) and "strong support for the defense" (100), with the midpoint labeled "neutral" (50). This rating indicates how much weight or probative value each subject assigned to each argument. Together with the argument's recall, this rating indicates the contribution of each argument to the subject's overall judgment of guilt.

After rating the importance of each argument, the subjects answered three questions about the defendant's degree of drunkenness and guilt on unnumbered 11-point scales. The first question asked, "How drunk do you think Sanders [the defendant] was at the time of the accident?" on a scale anchored at "absolutely sober, no impairment of judgment or motor activity" and "absolutely drunk, total impairment of judgment or motor activity", with the midpoint labeled "moderate impairment of judg-

ment or motor activity." The second question asked their "personal opinion of the defendant's guilt or innocence" on a scale anchored at "not guilty beyond doubt" and "guilty beyond doubt," with the midpoint labeled "uncertain." The last question asked the subjects to assume that they were members of a jury obligated by the criterion of "guilty beyond a reasonable doubt" and asked them to render a verdict on a scale anchored at "Sanders should certainly be acquitted" and "Sanders should certainly be convicted," with "completely undecided" as the midpoint. After rendering this last judgment, the subjects were dismissed and asked to return 48 hours later to the same room.

Session 2: When the subjects returned, they were asked to write a brief description of as many arguments, both prosecution and defense, as they could recall. They were allowed 8 minutes to list this information, which was more than adequate. Next, they were asked to indicate their "current opinion" on the same three questions regarding the defendant's degree of drunkenness and guilt. The instructions explained that they need not answer the same way they did before and asked them to make their judgments as if they "were deciding the case now for the first time." Using the same scales as before, subjects indicated their current judgments of how drunk the defendant was, their personal opinions of his guilt, and their probable verdicts if they were a member of a jury.

After answering these questions, the subjects were given the 18 arguments they had read in the first session and asked to indicate their "current impression of the importance of each item" on a scale identical to the one they had used before. This was to check whether the subjects' judgments of an argument's evidentiary value remained constant, or whether it changed in congruence with the overall guilt judgment. After re-rating each summary of evidence, the subjects were thanked, debriefed, and dismissed.

Results

Recall Measures

Each subject's recall protocol from the second session was scored for the number of prosecution and defense arguments using gist or substance criteria (intruded statements were very rare and were excluded from the scoring). A second independent rater scored a random half of the recall protocols using the same criteria. Interrater agreement on the number of defense and prosecution arguments recalled was quite high, with correlations of .99 and .98.

Unconditional recall. The four groups of subjects did not differ in the total number of

arguments recalled at the second session. A 2 (Vivid Prosecution/Vivid Defense) \times 2 (Good Guy/Bad Guy) unweighted means analysis of variance revealed no significant main effects (both $F_s < 1$) nor a significant interaction, $F(1, 43) = 1.76$, *ns*. Subjects recalled an average of 13.13, or 73%, of the 18 arguments of evidence. In short, there were no systematic retention differences among the experimental conditions.

Conditional recall. We anticipated that subjects would recall a disproportionate number of arguments that were either vivid or congruent with their global impression of the defendant. Accordingly, for each subject we calculated the ratio of prosecution arguments recalled to the sum of prosecution and defense arguments recalled. We will refer to this $P/(P + D)$ ratio as the "prosecution proportion." An analysis of variance of these proportions yielded a significant effect for vividness, $F(1, 43) = 8.15$, $p < .007$, a marginally significant effect for the defendant's favorableness, $F(1, 43) = 3.28$, $p < .07$, and a nonsignificant interaction, $F(1, 43) = 1.02$, *ns*. As anticipated, subjects disproportionately recalled the vivid arguments. Subjects in the vivid prosecution condition recalled a higher proportion of prosecution arguments (51%) than subjects in the vivid defense condition (45%). Subjects also disproportionately recalled arguments that were inconsistent with their global impression of the defendant. Subjects in the good guy condition recalled a higher proportion of prosecution arguments (50%) than subjects in the bad guy condition (46%). Thus, subjects recalled slightly more damaging evidence about the favorable defendant.

We also calculated the proportion of subjects whose recall of prosecution arguments exceeded their recall of defense arguments, excluding seven subjects who recalled equal numbers of each. The group difference between these proportions (arc sine transformation, see Langer & Abelson, 1972) was highly significant for the vividness manipulation ($Z = 3.02$, $p < .003$) and marginally significant for the favorableness manipulation ($Z = 1.94$, $p < .06$). A higher proportion of subjects in the vivid prosecution condition (67%)

recalled relatively more prosecution arguments than in the vivid defense condition (21%). In addition, a higher proportion of the subjects in the good guy condition (60%) recalled relatively more prosecution arguments than subjects in the bad guy condition (30%).

Finally we examined the order of recall, indexed by the first argument recalled, to assess the initial availability of the various arguments. We calculated the proportion of subjects who recalled a prosecution argument first. Analysis of the differences between proportions (arc sine transformations) revealed no significant effect due to vividness ($Z = .72$, ns) but a marginally significant effect due to the defendant's favorableness ($Z = 1.94$, $p < .06$). Seventy-five percent of the subjects in the good guy condition first recalled a prosecution item of evidence, whereas 48% of the subjects in the bad guy condition first recalled a prosecution item of evidence.

Judgments of Apparent Guilt

Subjects' judgments of how drunk the defendant was, their personal opinion of his guilt, and their probable verdict if they had been a member of a jury were highly correlated (from .59 to .84). Consequently, each subject's responses to these three questions were averaged to yield a composite index (scored 0 to 100) of the defendant's apparent guilt, with high scores indicating greater mean apparent guilt.

Immediate judgments. We anticipated that neither the vividness of the arguments nor the favorableness of the defendant would affect judgments made immediately after the arguments were presented. No immediate effects were anticipated, because at this point nearly all of the arguments should be easily recallable and incorporated into judgments of apparent guilt. We performed an unweighted means analysis of variance on subjects' composite judgments of apparent guilt rendered immediately after reading the arguments. There were no significant main effects (both $F_s < 1$) nor a significant interaction, $F(1, 50) = 2.61$, ns . Vivid prosecution subjects judged the defendant to be as guilty ($M = 48.8$) as did the vivid defense subjects ($M = 43.4$). Moreover,

good guy subjects judged the defendant to be as guilty ($M = 48.0$) as did the bad guy subjects ($M = 44.2$).

Delayed judgments. We further anticipated that after a retention interval a person's judgments would be disproportionately influenced by the more available (i.e., recallable) arguments. To test this idea, an unweighted means analysis of variance was performed on subjects' composite judgments of apparent guilt given during the second session. Congruent with their differential recall of the arguments, subjects in the vivid prosecution condition judged the defendant to be more guilty ($M = 52.4$) than did subjects in the vivid defense condition ($M = 39.5$), $F(1, 43) = 5.13$, $p < .029$. Furthermore, subjects in the good guy condition, told that the defendant was a "warm, friendly veterinarian," judged the defendant to be more guilty ($M = 52.6$) than subjects in the bad guy condition, told that the defendant was a "cold, unfriendly longshoreman" ($M = 39.2$), $F(1, 43) = 5.61$, $p < .022$. The interaction was not significant, $F(1, 43) = 2.23$, ns . In short, arguments that were disproportionately recallable in memory had a correspondingly disproportionate impact on judgments of apparent guilt.¹

¹ We assume that the treatments affected the availability of the relevant arguments, which in turn influenced judgments. However, it is possible to imagine an alternate causal chain in which the treatments changed the subjects' delayed judgments without the mediation of availability, and the judgments led to the differential recall in the service of justification. The latter position, however, requires that the treatments affect a mysterious third variable that in turn affects judgments. It also requires that the effects of this third variable occur after a delay, since the treatments had no significant effect on the immediate judgments.

One possible third variable accounting for the differences on the delayed measures might be a tendency for subjects' judgments to become more extreme over time as a consequence of greater thought (cf. Tesser & Conlee, 1975; Tesser & Cowan, 1975). A sign test comparing the number of subjects whose judgments became more extreme (more guilty or more innocent relative to their initial judgment) with the number of subjects whose judgments became less extreme showed no difference. In fact, shifts toward extremity were equalized by shifts towards moderation. This rules out polarization as a cause of the differences in the delayed judgments.

To determine whether the delayed judgments showed a significantly greater effect of vividness and defendant favorability than the immediate judgments, an analysis of covariance of the delayed composite judgments of apparent guilt was performed using subjects' immediate composite judgments of apparent guilt as a covariate. If the delayed effects are reliably greater, then significant main effects should be found for both the vividness and the defendant favorability manipulations after any immediate impact is eliminated. An unweighted means analysis of covariance yielded a significant effect for vividness, $F(1, 42) = 4.62$, $p < .05$ (vivid prosecution condition adjusted $M = 49.5$, vivid defense condition adjusted $M = 42.4$); a marginally significant effect for the defendant's favorableness, $F(1, 42) = 3.02$, $p < .10$ (good guy condition adjusted $M = 48.8$, bad guy condition adjusted $M = 43.1$); and a nonsignificant interaction, $F(1, 42) < 1$, *ns*. These results indicate that vividness, and to a limited extent the defendant's favorableness, had a significantly greater effect on delayed than on immediate judgments.

Strength of the Arguments

To what extent did the vividness of the arguments and the favorableness of the defendant affect the strength or perceived importance of the arguments? To answer this question, each subject's importance ratings of the arguments were scored on a 101-point scale anchored at "strong support for the prosecution" (-50) and "strong support for the defense" (+50), with the midpoint labeled "neutral" (0). Each subject's ratings of the prosecution arguments, both immediate and delayed, were separately averaged, as were ratings of the defense arguments.

Separate analyses of variance of the immediate and the delayed weightings of the prosecution arguments yielded no significant main effects or interactions. Similarly, separate analyses of variance of the immediate and the delayed weightings of the defense arguments yielded no significant main effects or interactions.

We conclude, therefore, that the evidentiary

weight of an argument was the same whether or not a vivid elaboration was added, whether it referred to a good or a bad defendant, whether it was being evaluated at the first or second session. We had hoped for equal means here, validating our assumption that the evidentiary weight of an argument would not vary with our experimental factors.

Relationship Between Recall, Strength of the Arguments, and Judgments of Apparent Guilt

We anticipated that information that is disproportionately available in memory would have a correspondingly disproportionate impact on evaluative judgments. However, we made no predictions concerning the process itself. One theory is that the subject employs some heuristic to assess the relative availability of the pro and con arguments and then renders a judgment directly reflecting those availability differences.

To test this idea, we assessed the relationship between subjects' preferential recall for prosecution arguments—the prosecution proportion, $P/(P + D)$ —and their delayed judgments of apparent guilt. The product-moment correlation was significant but low, $r(45) = .31$, $p < .05$. Such a low correlation suggests that judgments of apparent guilt were not made simply on the basis of the differential availability of the arguments.

Another possibility is that subjects use a more complex decision rule, taking into account differences in the strength of the available (i.e., recallable) arguments. To test this notion, a "relative strength" index, reflecting the relative importance (weights assigned in Session 1) of the recalled prosecution versus defense arguments, was correlated with delayed judgments of apparent guilt. We noted which arguments each subject had recalled and how important the subject had previously rated them during Session 1. To calculate the relative strength index, we took the sum of the absolute value of the importance weightings of the recalled prosecution arguments and divided it by the sum of the absolute value of the importance weightings of both the recalled prosecution and the recalled defense arguments. To illustrate, suppose that a given sub-

ject recalled prosecution arguments A, B, and C with strength weights of -10, -40, and -5 and defense arguments D and E with strength weights 50 and 30. Then after converting to absolute values, the ratio of relative strength would be $(10 + 40 + 5) / (10 + 40 + 5) + (50 + 30)$, or $55/135 = .41$. This relative strength index indicates the importance of the recalled prosecution arguments relative to the recalled defense arguments.

A product-moment correlation was computed between the relative strength index of recall and the delayed judgments of apparent guilt. This correlation was quite substantial, $r(45) = .60$, $p < .001$. To the extent that subjects were likely to rate their recalled prosecution arguments as being more important than their recalled defense arguments, they were also likely to judge the defendant as being more guilty.

To test the consistency of this predictive formula, we computed an immediate relative strength index for each subject, summing across all of the arguments presented in Session 1, not just those recalled in Session 2. Assuming that most of the arguments are available immediately after their presentation, the immediate relative strength index should reflect most of the immediate evidential weightings given to the arguments by each subject. The product-moment correlation between the immediate relative strength index and the immediate judgments of apparent guilt (both from Session 1) was quite substantial, $r(52) = .64$, $p < .001$.

Discussion

The results support our hypothesis that information that is disproportionately available in memory has a correspondingly disproportionate impact on evaluative judgments. After reading a summary of a trial, people were more likely to recall arguments that were either vivid or, surprisingly, incongruent with their initial impression of the defendant. One process by which this might occur is that vivid or incongruent information, by being easier to recall, serves as a retrieval cue facilitating the further recall of the associated evi-

dentiary ideas necessary for evaluating the defendant. For example, a subject might first recall something about a bowl of guacamole dip being splattered over a shag carpet, from which the subject then recalls the associated basic evidentiary idea—that the defendant staggered against a table at the party, knocking the bowl to the floor.²

Moreover, people's judgments of apparent guilt paralleled their differential recall of the prosecution and the defense arguments. As expected, these effects were larger after a period of time had elapsed to allow for forgetting. Judgments of apparent guilt made immediately after the arguments were presented showed small but insignificant effects of vividness or incongruity, presumably because at that point most of the arguments were still available. The influence of vividness and incongruity grew relatively stronger after a delay, which allowed some of the information to decay from memory.

We are not the first to suggest that vivid information can have a disproportionate impact on complex social judgments. This suggestion was put forth by Nisbett, Borgida, Crandall, and Reed (1976) in an attempt to explain why base-rate information about a class of people often has less influence on people's judgments about the class than information about a single exemplary member of the class. Our study extends their suggestion that vivid information has disproportionate influence by showing that the superior memorability of vivid information is a mechanism by which this could occur (see also the discussion of our experiment in Nisbett & Ross, 1980).

In some respects, our explanation is similar to that put forth by Ross and Sicoly (1979) for egocentric biases in people's attributions of responsibility for a joint endeavor. Ross and Sicoly argue that people overestimate their own contributions because their personal involvement makes it easier to recall their own contributions than the contributions of others.

² The more vivid information might be better recalled because it is better learned initially or forgotten less rapidly. The difference is immaterial for our purposes.

We anticipated that information congruent with a global impression would be better recalled than incongruent information. Our intuitions were shaped by prototype theories (Cantor & Mischel, 1977; Rosch, 1973) and schema theories (Bransford & Franks, 1972; Mandler & Johnson, 1977; Minsky, 1975; Shank & Abelson, 1977) that imply that information consistent with some general concept is more likely to be recalled. Several experiments (e.g., Bear & Hodun, 1975; Cantor & Mischel, 1977; Hamilton & Gifford, 1976; Zadny & Gerard, 1974) dealing specifically with social information have generally confirmed that information congruent with an expectation, impressing, or stereotype is better recalled. Surprisingly, however, we found that information *incongruent* with the participant's global impression of the defendant was more likely to be recalled and disproportionately utilized in evaluative judgments. Our subjects remembered more positive (extenuating) information about the bad defendant and more negative (condemning) information about the good defendant.

A possible reason for this discrepancy may lie in the speed with which the information was presented and the corresponding memory load. In studies where congruent information is better remembered, participants typically are overloaded with a large amount of information presented at a high rate. Under such conditions of high memory demand, participants are likely to rely on superordinate schemas to subsume, encode, and effectively reduce the barrage of incoming information. Consequently, under a high memory load, information congruent with the superordinate schema is better encoded and recalled. In the present experiment, however, the material was presented slowly, placing no overload on the participants' memories. Rather, they went at their own pace as they read through the materials twice. We assume that under these conditions the incongruent information is likely to stand out, perhaps because it is more "informative" than congruent information. This may be why the incongruent information (e.g., prosecution argument against the good defendant) was more likely to be recalled.

Our results, suggesting that information

which is disproportionately available in memory will have a correspondingly disproportionate impact on evaluative judgments, appear to be inconsistent with a few findings in persuasion research suggesting that attitudes are unrelated to the retention of persuasive arguments (Greenwald, 1968; Insko, 1967; McGuire, 1968). For example, Greenwald, Albert, and Cullen (reported in Greenwald, 1968) had subjects read six arguments favoring foreign aid and six arguments opposing foreign aid. Some subjects rehearsed either the favorable or unfavorable foreign aid arguments to improve their recall. After a delay, subjects recalled more of the rehearsed arguments than the unrehearsed arguments. However, these recall differences were not reflected in the subjects' attitudes toward foreign aid. Subjects who had rehearsed and improved their recall of favorable arguments did not differ in their attitudes toward foreign aid from the subjects who had rehearsed and improved their recall for the unfavorable arguments. Neither group differed from subjects in a control condition who did not rehearse the arguments and who had equal recall for both the favorable and unfavorable foreign aid arguments. Thus contrary to our results, Greenwald et al. found that subjects' attitudes were unaffected by differences in their recall of persuasive arguments.

Why the discrepancy? One possibility is that subjects tag in memory the list of arguments to be memorized (as though it were an arbitrary list of nonsense syllables) and that they discount the evidentiary value of their later recall, since they remember the differing memorizing treatments accorded to the pro and con arguments. Thus when asked for their opinion on foreign aid, the Greenwald et al. subjects may not have relied on their recall of the arguments to form a new opinion, but rather recalled a previous opinion they had formed when the foreign aid arguments were initially presented. In contrast, we instructed our subjects to recall and re-evaluate the arguments before making their delayed judgments and to make their judgments as if they were deciding the trial for the very first time. Our instructions probably induced subjects to make their delayed judgments by in-

tegrating the arguments they could recall to form a new judgment rather than relying on their memory of their previous judgments.

If this line of reasoning is correct, then differences in the availability of information in memory should have the greatest impact on novel or unanticipated social judgments in which people have not previously formed an opinion. For example, if asked whether John would be a good father, we probably have no prior opinion. Thus, we try to answer this question by recalling and integrating the relevant information from memory. For such judgments constructed by retrospection, differences in the availability of information should result in biased evaluations. However, when asked our opinions on a previously considered issue such as foreign aid, we probably just react with our previously formed opinion on the topic. The difference corresponds to retrieving a stored answer (as in "What's 4 times 7?") versus calculating and constructing an answer (as in "How many Catholics do you know?"). One can retrieve an earlier summary judgment without having to retrieve any arguments for it. In this case, the opinion expressed need not correspond to our ability to retrieve more arguments in its favor, although that is a likely state.

A second possible reason for the differing outcomes of our study and the others cited hinges on the way in which people integrate information in forming opinions and judgments. Although persuasion research shows low correlations between expressed opinions and the sheer number of recalled arguments, the perceived importance of the recalled arguments is not taken into account. For example, subjects in the Greenwald et al. study (reported in Greenwald, 1968) recalled more of the arguments they had rehearsed; however, they may have also recalled the most important and persuasive of the arguments they did not rehearse. A few important arguments on one side of the issue may have balanced out a larger number of unimportant arguments on the other side, causing opinion to be poorly correlated with availability of the arguments.

Interestingly, although the results of our study indicate that more available information has more impact on final judgments, the avail-

ability of an argument is not the sole determinant of its impact. The correlation between subjects' preferential recall for prosecution arguments and their final judgments of guilt was significant but low, $r(45) = .31$, $p < .05$. By contrast, participants' preferential recall for prosecution arguments, taking into account the importance of each argument they recalled (by means of a simple averaging model), correlated more highly with the subjects' delayed judgments of guilt, $r(45) = .60$, $p < .001$. A similar analysis of subjects' immediate judgments of guilt (which assumes that most of the evidence is available immediately after its presentation) yielded a similar correlation, $r(52) = .64$, $p < .001$.

This pattern of correlation is consistent with the following judgment model. Arguments for and against the defendant's guilt are assigned a certain positive strength, s_i , by each participant. Independent of the strength of an argument is its memorability, r_i , which is affected by vividness, recency, repetition, and the distinctiveness of the information. A person's judgment can be conceived as a result of recalling a sample of arguments from memory and forming a weighted ratio of pro-guilt arguments to all arguments recalled. That is,

$$\text{judged guilt} = \frac{\sum_{i \text{ in } P} r_i s_i}{\sum_{j \text{ in } (P \text{ and } D)} r_j s_j} \quad (1)$$

The sum in the numerator ranges over the prosecution arguments; the sum in the denominator ranges over the prosecution and defense arguments. Equation 1 is similar to Luce's (1959) axiom of preferential choice, where $v_i = r_i s_i$ is a positive number reflecting the composite strength of the i th argument for guilt. The composite strength of an argument depends on its evidentiary strength (or Bayesian diagnosticity of guilt) and on its recallability. Recallable arguments that are unimportant will have as little impact as important arguments that are unrecallable. Equation 1 captures folklore about lawyers' presentation of evidence in a trial: Emphasize or highlight your most important arguments, repeat them often, and try to have the last word.

We believe that the effects of availability on social judgments outside the laboratory are larger than we were able to demonstrate. The vividness treatment we used to affect availability in this study was, of necessity, quite weak to avoid influencing the probative value of the arguments and thereby confounding the effects of vividness on availability with its effects on the strength of the arguments per se. The vivid and pallid versions of an argument described the same incident but differed merely in elaboration and specificity. Because the incidents described in the arguments were concrete, the differences between the vivid and pallid arguments were not large. The information encountered in a daily experience varies far more dramatically in memorability than the information in this study. Thus, differences in the availability of information probably exert a greater influence on social judgments in the real world than they did with our constrained materials.

Our experiment has identified one more source of bias in opinion formation: the availability of relevant information. Availability should have its major impact on summary judgments that are constructed retrospectively by retrieving, evaluating, and integrating relevant information, even information organized and stored under other categories for other purposes. To the extent that the memorability of the information increases with its diagnostic importance, the availability heuristic leads to faster, more confident, and more accurate judgments, which make the heuristic ecologically adaptive. But as with rules of thumb, the availability heuristic can be "fooled" when memorability is unrelated or inversely related to the diagnostic value of the evidence. Then flashy, dramatic facts can flood the mind of the decision-maker, outweighing by their insistence alone the more pallid truths of the case.

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