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## Exemplar-Based Model of Social Judgment

Eliot R. Smith  
Department of Psychological Sciences  
Purdue University

Michael A. Zárate  
University of Texas at El Paso

As an alternative to algebraic and schematic models of social judgment, a new exemplar-based model holds that representations of specific individuals influence judgments about persons and groups. (a) As the perceiver encounters or thinks about an individual, a representation of that exemplar as interpreted by the perceiver is stored in memory. (b) When a target person is encountered later, known attributes of similar exemplars from memory influence judgments about the target. Similarity is modulated by the perceiver's attention to stimulus dimensions. (c) Social and motivational factors, including perceiver self-schemata, social context, and in-group/out-group dynamics, influence social judgment by affecting perceivers' attention to dimensions. Computer simulations show how the model accounts for social influences on exemplar access and use and therefore on the content of social judgments.

Suppose that you have to make a social judgment about a target person. For example, you might need to decide whether Saddam Hussein is dangerous. What types of information might a perceiver draw on in making such a judgment, and how might it be processed?

Theorists and researchers have developed two broad models of social judgment that give answers to these questions. *Attribute-based* linear models of judgment, exemplified by information integration theory (Anderson, 1981), assume that perceivers identify attributes of the stimulus person that have implications for the dimension of judgment. Thus, the perceiver is assumed to know about many person attributes (has a large army and violates human rights) and their positive or negative implications for many possible judgmental dimensions (dangerousness or likability). The perceiver processes this information by weighting and combining those implications algebraically into an overall judgment.

*Schematic* models assume that perceivers categorize persons or other stimulus objects, then use knowledge about the category's typical characteristics to flesh out available information about the particular stimulus. The perceiver's knowledge about categories is assumed to be organized in abstract, generic knowledge structures of schemata (see Higgins & Bargh, 1987). Once an object is categorized, judgments are often based on schematic knowledge rather than on the stimulus information itself. In the domain of person perception, the most relevant form of schematic knowledge is *stereotypes*: knowledge about the traits or other attributes (aggressive or sociable) that the perceiver believes are typically associated with a social category or group (Middle Eastern dictators or fraternity members). Schematic models make the distinctive prediction, not shared by attribute-based models, that the intrinsic evaluation of an

attribute may have nothing to do with the effect of that attribute on the evaluation of an object. For example, an attribute that is negative (or neutral) in itself might be a cue that the object belongs to a positively evaluated category. (In the domain of automobiles, "has no rear seat" is intrinsically a negative attribute but is a strong cue to the positive category "sporty car.")

Some theorists (Brewer, 1988; Fiske & Neuberg, 1988) have developed models in which both schematic and attribute-based judgment processes come into play under different circumstances. For example, a stimulus person who is seen as highly typical of a category may be judged on the basis of the perceiver's knowledge about the category, whereas poor fit to the category may lead to a more individuated, attribute-by-attribute judgment process. These dual-process models, too, assume that general, abstract cognitive representations (schematic knowledge and knowledge about attribute-judgment relationships) underlie social judgments.

This article presents a third, basically different type of model of social judgment, an exemplar-based model in which specific past experiences with the target person and other individuals, as well as more abstract schematic knowledge, influence judgments and perceptions of people and groups. The most fundamental reason for exploring models of this sort is that recent research shows human memory to be strikingly specific. Low-level details like the typeface in which a word was read or its location on the page are preserved in memory over long periods, though a purely schematic account of memory would predict that only the semantic content of an item should be represented (Alba & Hasher, 1983). If theorists move toward recognizing the existence and widespread effects of very specific cognitive representations—as researchers studying memory and cognitive processes are increasingly doing (see Brooks, 1987; Logan, 1988)—then the potential role of specific representations in judgment should also be investigated. For example, exemplar representations might be important mediators of well-known phenomena like illusory correlation or category-accessibility effects (see Smith, 1990, 1991; Smith & Branscombe, 1988).

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Correspondence concerning this article should be addressed to Eliot R. Smith, Department of Psychological Sciences, Purdue University, West Lafayette, Indiana 47907-1364.

In overview, we assume that the perceiver has many cognitive representations of persons (exemplars). Each representation includes not only encoded perceptual attributes of the person but also the perceiver's inferences, attributions, and reactions. When the perceiver encounters a new target person, information from stored representations that are similar to the target will be used to make judgments and inferences about the target. Under this exemplar-based model, for example, Saddam Hussein might be judged to be dangerous not directly on the basis of his own attributes or the way he is categorized but because he (consciously or unconsciously) reminds the perceiver of Adolf Hitler, whom the perceiver considers dangerous. This exemplar-based model also makes a distinctive type of prediction not shared by either of the other classes of models. Any attribute or situational factor that makes the retrieval of the Adolf Hitler exemplar from memory more probable—even something as trivial as the fact that Saddam Hussein wears a moustache—will tend to increase his judged dangerousness. As we discuss later, there is evidence for effects of this type.

More formally, the exemplar-based model rests on three fundamental postulates. First, it holds that exemplar representations can be accessed from memory and influence judgments concerning a target stimulus, independent of the perceiver's conscious awareness of the effect—or even the existence—of the prior experience. In other words, a major focus of this model is on implicit memory effects on social judgments (cf. Schacter, 1987; Smith & Branscombe, 1988). For example, a perceiver may expect that a newly encountered individual is likely to prove unpleasant because a similar, recently encountered person behaved in an obnoxious fashion (Lewicki, 1986).

Second, the model assumes that the effect of known exemplars on judgments or decisions depends on their similarity to the target stimulus. Similarity is not taken to be a fixed, context-independent property of stimuli, but is modulated by the perceiver's relative allocation of attention to stimulus dimensions, as originally postulated by Medin and Schaffer (1978) in their influential context model (Nosofsky, 1987). Thus, if a perceiver pays more attention to one stimulus dimension (e.g., gender) and less to another (e.g., race), that would influence what exemplars would be seen as most similar to a specific target stimulus. A Black male stimulus person might cue the retrieval of representations of other males instead of other Blacks, for instance.

The third assumption is that a range of social and motivational factors including individual differences, the perceiver's past experiences, the self-schema, the current social context, in-group/out-group dynamics, and the like, which are known to affect social judgment, do so by shaping the perceiver's attention to stimulus dimensions and therefore influencing exemplar retrieval and use. For example, perceivers who are more racially prejudiced, in whose social context Blacks constitute a small minority, or for whom Blacks are an out-group, may pay more attention to a target's race than to his or her occupation, personality characteristics, or other attributes. More attention to race in turn means that all Blacks are perceived as relatively similar to each other and different from non-Blacks. Therefore, known Black exemplars rather than known professor exemplars might be given most weight when the perceiver makes judgments about a Black professor.

In combination with the previous two assumptions, this emphasis on social and motivational determinants of attention yields powerful and integrative theoretical explanations for many known phenomena including patterns of individuation versus stereotyping in person perception and the out-group homogeneity effect. Overall, this new exemplar-based model brings together the social (e.g., effects of the perceiver's self-attributes, motivations, and history) and the cognitive (e.g., the form and content of cognitive representations and processes of their access and use) in a unified account of social judgment. The model accounts for such social effects by making specific, testable predictions about the ways they affect the processing, representation, and retrieval of social exemplars. Only such an integrative model can begin to address the complex, multiply determined phenomena involved in social categorization, stereotyping, person perception, and social judgment.

In stressing the role of exemplars in this article, we do not wish to set up a competing straw man model that says only abstract, schematic knowledge plays a role in social judgment (see Alba & Hasher, 1983). Rather, we assume the existence of exemplar effects on the basis of compelling evidence and propose a theory to organize and explain them. This effort in no way requires the assumption that schematic knowledge structures and information integration processes do not exist or have a role in social judgment, and we do not make this assumption. Clearly perceivers possess schematic, group-level knowledge (perhaps derived from social learning, such as being told that "all news media personnel are members of a liberal conspiracy"), but such knowledge will enter only minimally into the predictions and phenomena to be explored here. Theoretical integration of the judgmental effects of schematic knowledge and the effects of exemplars, once the latter are encompassed in a coherent theory, remains a very important long-term research goal.

### Proposition 1: Exemplars Are Stored as Interpreted and Retrieved to Make Social Judgments

The first postulate of our model is that exemplar representations are stored in memory and can be retrieved to influence social judgments and decisions. In our usage in this article, an *exemplar* is a cognitive representation of an object of the same type as the current target of judgment. Most often we discuss judgments about individual persons (e.g., "Is Saddam Hussein dangerous?"), in which case an *exemplar* is simply a cognitive representation of a person. When the perceiver is making judgments about behaviors (e.g., "Is helping friendly?"), the relevant exemplars are representations of behaviors. This definition of *exemplar* has several implications.

1. An exemplar differs from a prototype or schema, both of which are generally taken to involve abstract knowledge about the typical or expected properties of a social group. Exemplars (cognitive representations of individuals) can range from very detailed, complete representations of specific people (my mother or my close friend) to minimal representations involving only two or three attributes. A person need not be encountered face to face to be represented in memory but may be imagined or experienced through the media or a secondhand account (see Linville, Fischer, & Salovey, 1989). Reading a news-

paper story that identifies a White male aged 18 as a suspect in a mugging might lead to the formation of a minimal representation (White, male, teenager, and criminal). Cognitive representations of characters from fiction and the general culture (Rambo, Robin Hood, and Dan Quayle) are also exemplars. In fact, a cognitive representation of an individual who is subjectively typical of a social category (a “yuppy” or a “typical fraternity member”) can also be constructed. Such a representation might (confusingly) be called a prototype of the category, but by definition it is also an exemplar. In the model presented here it would be accessed and used just like any other exemplar, rather than having any special status because it is subjectively representative of a whole group. (We consider more fully the issues involved in distinguishing effects of prototype vs. exemplar representations later.)

2. Exemplars that influence perception and categorization may not be accessible to conscious recollection. That is, exemplars that affect the identification, categorization, or evaluation of a stimulus may not be the same ones that are retrieved in an explicit memory task like recall or recognition (Brooks, 1987; Jacoby, 1983; Jacoby & Kelley, 1987; Lewicki, 1986). This point is elaborated shortly.

3. An *exemplar* is a representation of the stimulus person or object as interpreted by the perceiver, rather than a veridical or “pictoliteral” (Brewer, 1988) copy of the available stimulus information. For instance, if a prejudiced individual encounters a member of an ethnic minority and infers that the target is hostile, the attribute of hostility will probably be stored as part of the exemplar representation of the target person—even in the absence of any actual hostile behaviors by the target. This process can generate seeming support for the initial stereotype, in a circular and self-fulfilling manner.

Several researchers have previously suggested that memory representations of specific objects or experiences (exemplar information) can influence social judgment (Judd & Park, 1988; Linville et al., 1989; Mullen, 1991; Park & Hastie, 1987; Read, 1987; Rothbart & John, 1985; Rothbart & Lewis, 1988; Sherman & Corty, 1984; Smith, 1990). Here, we briefly review evidence that exemplars affect social judgments in general and social categorization in particular, that a memory trace of a previous exposure to the same exemplar (i.e., stimulus familiarity) has a variety of effects on judgment, and that exemplars must be considered to reflect the perceiver’s interpretation of the stimulus, not just objective stimulus attributes.

### *Exemplars Affect Social Judgment*

Effects of previously encountered exemplars on reactions to nonsocial stimuli have been demonstrated by research on analogy use in problem solving and text comprehension (e.g., Holyoak & Koh, 1987; Novick, 1988). There is also evidence of exemplar effects on social judgments. In one study (Lewicki, 1986, p. 200), people encountered an experimenter who insulted them as they were filling out a questionnaire. Later the subjects were instructed to take their completed experimental materials to the assistant who was not busy when they entered the room. When the subjects got there, both assistants were free, requiring an arbitrary choice. Subjects who had been insulted by the experimenter tended to avoid one assistant whose

hairstyle resembled that of the experimenter. Control subjects who were not insulted by the experimenter showed no such tendency. Lewicki’s (1986) subjects uniformly denied that the earlier encounter had any effect on their later behavior. Although it is clear in this case that subjects would have been able to consciously access the exemplar representation of the hostile experimenter, this verbal report suggests that the effects identified by Lewicki (1986) in this and other studies are not dependent on the subject’s intentionally and consciously drawing an analogy between the target person and the earlier experience.

Gilovich (1981) demonstrated similar effects by giving subjects (who were sportswriters and college football coaches) brief descriptions of fictitious college football players. Some descriptions were constructed to create a linkage between the described player and a highly successful professional player. The linkage was logically irrelevant to the college player’s ability or future success (e.g., the college player had won the Joe Montana Award at his school, or the college player came from the same hometown as the pro). Nevertheless, these players were rated as having significantly higher potential for future success than were comparable control descriptions where no such linkage existed. In another demonstration, White and Shapiro (1987, Experiment 2) had subjects hold a several-minute phone conversation with a target who, the subject was led to believe, either did or did not physically resemble a close friend of the perceiver’s. After the conversation, perceivers rated the familiar-appearing targets as more similar to the friend on important personality dimensions.

In perhaps the most compelling demonstration of exemplar influence on judgment, Andersen and Cole (1990, Study 3) had subjects generate a list of attributes of a specific individual they knew well, attributes of a well-known social stereotype (e.g., redneck), and attributes of an abstract trait category (e.g., honest person). In a supposedly unrelated memory experiment, subjects then read descriptions of fictitious stimulus persons and were tested on them with a recognition procedure. When the description of a stimulus person included some attributes drawn from the subject’s description of a specific friend, subjects tended to report falsely that the description had also included the friend’s other attributes. For instance, suppose the subject had described a friend as “tall, intelligent, ambitious, and humorless.” If a fictitious character description included the last three of these traits intermixed with some fillers, the subject would be likely to falsely recognize *humorless* as also having been part of the description. When Andersen and Cole used subjects’ descriptions of a social stereotype and a trait category instead of a friend to construct the stimulus materials, the tendency to false alarm on the related but unrepresented traits was significantly weaker. Thus, representations of specific individuals can serve as more powerful bases of inferences about new targets than such general knowledge representations as stereotypes and traits.

These findings suggest that people store information and evaluations in memory linked to specific exemplars and generalize those attributes to new stimuli on the basis of similarity to the stored exemplars. Kahneman and Miller’s (1986) norm theory also proposed that a target stimulus “recruits” representations of similar experiences from memory as a norm that will influence judgments about the target by serving as a source of

expectations as to the target's likely attributes or as a standard of comparison against which the target is judged. Connectionistic models of memory (e.g., McClelland & Rumelhart, 1985) or the exemplar-based memory model of Hintzman (1986) furnish plausible accounts of how such a similarity-based retrieval process might function to "fill in" or generate expectations about unobserved attributes of the current stimulus, on the basis of the known properties of similar, previously encountered exemplars.

Other theories of social judgment have difficulty with findings like those just reviewed. One could argue that a single encounter with a hostile long-haired individual could alter one's schematic knowledge (stereotype) about long-haired people, but that hardly seems plausible. And if it is argued that a single experience can have a major impact on schematic knowledge, even for a short time, then any clear conceptual distinction between general, abstract schematic knowledge and memory traces of specific experiences or episodes is lost—the very meaning of the term *schema* is destroyed (cf. Jacoby, Baker, & Brooks, 1989). Similarly, in an information integration perspective, one would be hard pressed to argue that the valuation or the weight of specific person attributes should be changed in a lasting way by a single experience with an individual. The most reasonable interpretation of these effects appears to be that the target serves as a cue for the retrieval of similar exemplar representations from memory, allowing information stored with the exemplars (such as the perceiver's attitude) to be accessed and applied to the current target.

### *Exemplars Influence Categorization and Therefore Stereotyping*

A new stimulus can be categorized on the basis of the category membership of similar known exemplars rather than on the category prototype. For example, a newly met person may be classified as a Californian because he or she is very similar to a specific known Californian—not by comparing him or her with a prototypical Californian (Medin & Smith, 1981). In this article, consistent with the bulk of the social psychological literature, we use the term *prototype* for a cognitive representation of a category's average or typical values of key attributes (Posner & Keele, 1968; Reed, 1972). Such a representation does not include idiosyncratic attributes that are possessed by only one or a few category members. Cantor and Mischel (1977), for example, define *categories* as representations that "may vary from an abstract image, comprised of the average value of each feature pictured in the set of presented items . . . to a collection of the most typical or highly related features associated with a category label" (p. 39). Similarly, Fiske, Neuberg, Beattie, and Milberg (1987) defined *social categories* as "a category label at the top level and expected attributes at a lower level" (p. 401).

Exemplar and prototype models of categorization make different predictions in many circumstances, as when a new stimulus is highly similar to one or more exemplars of Category A but is more similar to the prototype of Category B. The two models will make similar predictions if the exemplars of both categories cluster tightly around their respective prototypes with little overlap between categories, but this may be unlikely with realistic *social categories*.

Competitive tests between exemplar-based and prototype models of categorization strongly suggest that exemplars are important when people categorize nonsocial stimuli (Medin & Schaffer, 1978; Nosofsky, 1987). Unfortunately, only a few studies of categorization processes have used social stimuli. Medin, Dewey, and Murphy (1983) had subjects learn to categorize photographs of faces and found that an exemplar model was superior to independent-cue models (of which the standard prototype model is a special case) in learning conditions that led to good transfer of classification performance to new faces. Another study, using written person descriptions as stimuli (Smith & Zárate, 1990), similarly found that exemplar-based categorization predominated in all conditions except for one in which subjects actually learned the category prototypes to criterion before ever being exposed to any exemplars. Thus, perceivers can base category-membership decisions (and hence, presumably, stereotype usage) on a target person's similarity to known exemplars rather than on his or her similarity to a category prototype.

Even if one acknowledges that exemplars may influence categorization in some cases, the intuitively appealing notion of "economy of storage" might suggest that exemplar representations are used only for small or newly learned categories. Perhaps people prefer to use prototype representations for large or frequently encountered categories. However, research has shown effects of exemplars even with large and familiar nonsocial categories. Brooks and Whittlesea (cited in Brooks, 1987) showed subjects a photograph of a cup—an instance of a highly familiar category. Later, photographs of cups and other objects were displayed, and response time (RT) to answer whether the photo showed a cup was recorded. Both the old (previously seen) photo and other photos that were perceptually similar to it were classified very quickly—even faster than the most prototypical cups. Even for well-learned categories, then, specific recently encountered exemplars can affect classification.

However, it is impossible to support a general claim that categories will always be represented by exemplars rather than by prototypes. Different learning conditions lead to differences in the information subjects store during learning and therefore in their categorization processes (Malt, 1989; Medin, Altom, & Murphy, 1984; Nosofsky, Clark, & Shin, 1989). For example, some processing strategies or goals may lead subjects to attend to many individuating attributes of each stimulus person, forming a representation of an exemplar in the usual sense. New stimuli that are similar to specific old exemplars that are represented in memory will then be categorized accordingly.

On the other hand, if subjects attend to only group-typical attributes of each exemplar, while ignoring all idiosyncratic attributes, they will end up in effect with a prototype representation, one that incorporates only typical attributes. Encountering an individual identified as a fraternity member, the perceiver might draw an immediate stereotypic inference (e.g., that the person is highly sociable) and store a minimal representation consisting only of these two attributes without any individuating information. In content this representation is almost like a group prototype, for it contains only group identification and highly associated attribute information. However, in form it is just another exemplar, to be retrieved on the basis of similarity and used in future judgments in exactly the same way as

any other exemplar. The categorization decisions of a perceiver who possessed only a representation like this example would resemble those predicted by a prototype model; for example, similarity of a test stimulus to specific known exemplars would have no effect, but similarity to the category average would be an important determinant of categorization. However, perceivers typically store considerable individuating information about persons in contrast to other types of stimuli, like cups, especially if the target is motivationally relevant (Fiske & Neuberg, 1988). This fact means that exemplar-based categorization will differ from a prototype-based process. The exemplar model uniquely predicts that a target's degree of similarity to a specific known individual will affect categorization, independent of the target's distance from the category prototype—a pattern found by Whittlesea (1987), with nonsocial stimuli under learning conditions that encouraged subjects to individuate the exemplars.

Thus, if subjects strategically alter the way they process incoming exemplar information, they will change what is stored in memory and used in categorization judgments. Differences in the way exemplar information is processed can make the perceiver base categorization judgments on unique characteristics of specific known exemplars, or on only category-typical information (see Sherman & Corty, 1984, pp. 234–245). Our model encompasses these possibilities within a single framework by assuming that any representation subjects form—regardless of differences in its content—is retrieved and used in judgment by the same set of processes.

### *Judgmental Effects of Stimulus Familiarity*

If similar exemplars are used to make judgments about a target stimulus, a memory representation of a previous encounter with the same stimulus will have even more influence on the perceiver's current judgments and reactions. The reason is that this will typically be the most similar stored representation. Such effects, like the effects of exemplars on categorization and social inferences outlined earlier, can occur independent of the perceiver's ability to explicitly or consciously recollect the prior encounter. By definition, an effect of a prior experience on behavior or performance in the absence of a conscious memory is an *implicit memory* phenomenon (Schacter, 1987; Smith & Branscombe, 1988). For example, effects of mere exposure to a stimulus on liking and other reactions do not depend on the perceiver's ability to consciously remember the prior exposures (Mandler, Nakamura, & Van Zandt, 1987; Seamon, Brody, & Kauff, 1983).

Jacoby, Kelley, Brown, and Jasechko (1989) placed the effects of previous exposure on liking and other dependent variables in a common theoretical context, arguing that they reflect subjects' misattribution of their subjective feeling of familiarity concerning previously encountered stimuli. In one study subjects were given a list of names of moderately famous and nonfamous people and were asked to rate the fame of each one. The subjects had studied some of the nonfamous names in a list of names that they were told were all nonfamous. Under conditions where subjects could not recognize a previously seen nonfamous name as having been studied (e.g., after a delay between study and test), they were more likely to rate it as famous (Ja-

coby, Kelley, Brown, & Jasechko, 1989). The study exposure led to increased feelings of familiarity for the name, independent of the subject's ability to confidently recollect the circumstances of the prior exposure (for if subjects were able to do so, they could have definitely concluded that the name was nonfamous). Subjects misattributed the experience of familiarity as indicating that the name was famous.

In another study (Jacoby, Allan, Collins, & Larwill, 1988) subjects listened to spoken sentences mixed with noise. Some of the sentences had also been heard on a previous occasion. The previously heard sentences could more readily be understood when played through noise, but subjects did not attribute this perceptual fluency to the previous exposure. Instead, they said that the noise level was lower for some sentences (the old ones) than for others. Similarly, one might suppose that an argument that one has previously heard might be rated as more persuasive because it can be easily comprehended and "feels" familiar, even (or perhaps especially) if one cannot recall the previous exposure. In fact, plausible general-knowledge statements that are familiar because of prior presentations are subjectively rated as more valid than comparable novel sentences (Begg, Armous, & Kerr, 1985; Hasher, Goldstein, & Toppino, 1977). Presumably, subjects misattribute the familiarity, taking it as evidence of the sentence's truth.

In all of these cases, effects of a prior exposure on subjectively perceptible aspects of subjects' reactions to a stimulus are misattributed by the subject, mistakenly ascribed to objective qualities of the stimulus rather than to the subject's history of exposure. Of course, such misattribution is more likely under circumstances where the subject cannot consciously recognize the occasion of prior exposure. Like the effects of exemplars on judgment and categorization reviewed earlier, these effects can be explained only by assuming that a mental representation of a previously processed stimulus can influence judgments or reactions to the current stimulus in the absence of a conscious recollection of the earlier experience (Jacoby, Kelley, Brown, & Jasechko, 1989). These effects are difficult to explain within an attribute-based or schematic model of judgment. The general, abstract knowledge structures that are considered to mediate judgments under these models should not change much, or for a very long time, in response to a single experience with an exemplar. Yet such an experience can have a highly specific, long-lasting effect on judgment.

In summary, exemplar representations can influence judgments about new stimuli in three distinct ways. They can be used directly to generate inferences or expectations about the target (e.g., Lewicki, 1986), or they can affect their categorization and in turn the stereotype that will be applied (e.g., Smith & Zárate, 1990). In addition, a stored exemplar representation can produce a subjective sense of familiarity that is misattributed as an objective characteristic of the stimulus object (e.g., Jacoby, Kelley, Brown, & Jasechko, 1989).

### *Exemplars Represent the Stimulus as Processed*

Exemplars in memory are records of the stimulus as interpreted or as processed on the previous occasion, rather than a veridical record of the stimulus information that was present. Therefore, if a stimulus is repeated, not only the fact of the

previous exposure but also the type of processing that occurred then will determine its effect on the current occasion. Fazio (1986) has similarly argued that an attitudinal judgment or evaluation that is formed on one encounter with a stimulus can be stored in association with the mental representation of that stimulus. On a future encounter, the stored attitude may be automatically retrieved, coloring perceptions of the stimulus and making attitude-consistent behavior more probable. The way the person responded to the stimulus at Time 1 shapes the response at Time 2.

In general and not only in the attitude domain, when a person reencounters a known stimulus the repetition of the same processes or reactions is facilitated. The facilitation is often found to be independent of the subject's ability to consciously recall the previous stimulus exposure. Empirical results following this pattern have been obtained with a great diversity of social and nonsocial tasks and stimuli (e.g., Jacoby, 1983; Mitchell & Brown, 1988; Smith, 1989). For example, suppose I encounter an engineer from Georgia in a context that leads me to categorize him or her primarily as a Southerner rather than as an engineer. If I meet him or her again, the memory trace of this event should facilitate repetition of the same categorization relative to an alternative, even if I cannot recall the biasing circumstances of the earlier encounter or even the fact that it occurred. The categorization should further influence the stereotypic traits that I will attribute to the person (e.g., Southern vs. engineer stereotype traits).

One study (Smith, 1989) investigated judgments about whether behaviors (shown on a computer screen) imply a target trait such as *friendly*. With this task, specific behaviors that are repeated can be judged significantly faster than comparable behaviors that are encountered for the first time. This facilitation occurs even with a delay of 24 hr between the first and second presentation of the repeated behaviors and is independent of subjects' ability to consciously recognize that the behavior has been previously encountered. A recent study by Smith, Stewart, and Buttram (in press) extends this work, showing that having previously processed a particular behavior can affect the content of judgments as well as RTs. In two sessions 7 days apart, subjects made trait judgments about behaviors, answering yes-no questions about whether a few hundred behaviors like "billed a client for services rendered" were friendly. Other subjects judged whether the behaviors were *intelligent*. At the conclusion of the study, subjects completed an ostensibly unrelated questionnaire, evaluating a number of behaviors on a general positivity or social desirability dimension. Some behaviors embedded in this questionnaire were constructed to be intelligent but unfriendly; others were unintelligent but friendly.

Consistent with previous results (Smith, 1989), questionnaire behaviors that the subject had not previously encountered in the experiment were evaluated more in line with the trait implication that subjects were more practiced and efficient in drawing. For example, a subject who had made intelligence judgments would evaluate the intelligent-unfriendly behaviors more favorably than the unintelligent-friendly ones. However, this effect was significantly greater for specific behaviors that the subject had previously encountered among his or her hundreds of judgment trials—even for those that were seen 7 days earlier. A memory trace of the specific behavior, along

with the way it was processed at the initial encounter (i.e., what trait implication was assessed), must be assumed to endure and affect subjects' judgments on the questionnaire. This result also poses serious problems for attribute-based or schematic models of judgment that rest only on general semantic knowledge. Certainly, general knowledge about what makes a behavior positive or negative should not be changed in a lasting way by a half-hour experimental task; this would imply that a behavior would be evaluated similarly whether or not it had been previously judged on a trait dimension. Because the prior encounter with the behavior did influence later evaluation, the judgment must be influenced by a specific memory representation of the behavior and its interpretation (e.g., as friendly or unintelligent), formed at the time of the initial encounter.

Another study (Zárate, 1990) applied a novel frequency-estimation measure to obtain additional evidence that exemplars are stored as processed rather than in terms of their objective attributes. Subjects in a baseline condition saw 24 slides of faces, 6 of each type (Race  $\times$  Gender) randomly ordered, for 1 s each. Their instructions were very general (in effect, "look at these photos, and we will ask you questions later"). They were then asked to rank order the four categories *Black*, *White*, *male*, and *female* by the number of photos of each type. In another condition, 4 additional photos of Black males were added. Subjects are predicted to encode them as *Black* rather than as *male* (on the basis of theoretical logic to be developed later). As predicted, in this condition estimates of the number of Blacks significantly exceeded the number of men, whereas in reality equal numbers of Blacks and men were seen. Likewise, when extra photos of White women were included (which should be encoded as *female* rather than as *White*), subjects estimated that they saw more women than Whites. Thus, these results suggest that subjects encoded a preferred attribute of a photo but not both the sex and race attributes. If perceivers encoded both the race and gender attributes as they were objectively available the subjects would be able to provide relatively accurate frequency estimates when asked (Hanson & Hirst, 1988).

### Summary

In summary, evidence reviewed in this section shows that exemplars are stored in memory as they are interpreted and are retrieved in the process of social judgment. Exemplars can influence judgments and decisions even when the perceiver could in principle respond on the basis of his or her general knowledge, as in naming the object pictured in a photograph (Jacoby, Baker, & Brooks, 1989), categorizing stimuli according to a simple rule (Nosofsky et al., 1989), or making a trait judgment about a behavior (Smith, 1989). It is therefore plausible that a representation of Adolf Hitler might influence a perceiver's judgments about Saddam Hussein. Or a representation of a teenaged mugger constructed from a mention in the newspaper might be retrieved when encountering a teenager on a dark and deserted street.

### Proposition 2: Retrieval of Similar Exemplars Depends on Attention to Stimulus Dimensions

The strong and consistent evidence that exemplars can influence judgment does not itself yield specific, testable predic-

tions without a theory of when a particular exemplar representation will have effects. Suppose the perceiver learns of a horrible crime committed by a teenaged male resident of Wyoming. Why might this representation be retrieved when the perceiver considers a young target, but not when another male or resident of Wyoming is considered? Because the criminal is equally a member of all these categories, why is another teenager an effective retrieval cue for the exemplar representation whereas a male or a resident of Cheyenne is not?

### *Perceived Similarity Is Theory Dependent*

In discussions (in the previous sections of this article and in most of the existing literature) of the way exemplars that are similar to the target stimulus can influence judgment, we have used the term *similarity* in a relatively loose way. Similarity cannot be assumed to be a simple, fixed, context-independent property of a set of stimuli. Rather, similarity depends on the way the perceiver processes and interprets the stimuli. The way a person processes stimuli in a particular domain (e.g., persons) will depend on his or her theories concerning the identity and relationships among the stimuli (Medin, 1989). A theory may indicate what attributes are of central importance, including those that have causal implications for other correlated attributes. Attributes that are seen as central should receive particular attention, whereas attributes viewed as more peripheral or epiphenomenal may receive scant attention or fail to be encoded or cognitively represented at all. Social perceivers have no shortage of theories about people and social groups, such as the notion that women are naturally suited for a nurturing role, so that gender causes differences in psychological characteristics, such as empathy. On this basis, perceivers will probably tend to give more attention to gender than to empathy in processing information about individual persons. In this article we deal only briefly and speculatively with the content of people's theories about social attributes and categories. Instead, we focus more on the effects of a theory on perceivers' attention to stimulus dimensions and the resulting effects on similarity relationships among stimuli.

### *Formal Model of Attention and Similarity*

The effect of attention on stimulus identification and categorization processes has been formalized in the context model (Medin & Schaffer, 1978; Nosofsky, 1987). The model assumes that previously encountered exemplars are represented in memory, that similarity to known exemplars is the basis for identifying or categorizing a new stimulus, and that perceived similarity depends on the perceiver's allocation of attention to stimulus dimensions, shaped by aspects of the experimental context. To date, applications of the context model in the nonsocial literature have assumed that exemplars are retrieved only to identify or categorize the target stimulus, but the purpose of both identification and categorization is to bring relevant stored knowledge (about specific exemplars or about categories) to bear on a new target stimulus. Our chief contribution in this article is to add the assumption that exemplar retrieval on the basis of similarity is used directly to make judgments as well,

including trait judgments (e.g., is a person hostile?) and evaluations.

In Nosofsky's (1987) generalized version of the context model (GCM), which is used in this article, known exemplars are represented in memory in terms of a set of attribute (dimension) values and category membership. For instance, a number of persons who vary in gender, race, and age (attributes) and group membership (Group A or Group B) might be known. For identification, the probability that a new stimulus  $i$  will be identified as known individual  $j$  is a function of the similarity of stimulus  $i$  to  $j$ , divided by the total similarity of  $i$  to all known stimuli.<sup>1</sup> (This is the familiar similarity choice model of Luce, 1963.)

In social judgment, identification is the process that permits access to knowledge about the target individual's characteristics, the perceiver's attitude toward the target (Fazio, 1986), and so on that were stored on a previous encounter. Identification therefore allows the perceiver to respond appropriately to the specific person. For example, Test Stimulus T1 in Figure 1 is highly similar to Known Exemplar A2, so it will be identified as A2 with high probability. Differences in encoded attributes between T1 and A2 might result from real change over time in the properties of the person or from variation in the perceiver's encoding processes.

For categorization, the stimulus  $i$  is categorized in Group A with a probability depending on the summed similarity of  $i$  to all known Group A members, divided by the total similarity of  $i$  to all known stimuli. (This is a generalization of the context model of Medin & Schaffer, 1978.) Categorization permits the perceiver to access stored knowledge about the target's category and therefore to apply category-stereotypic traits and category-based evaluations to the target. Categorization and identification are closely related in the GCM, for identification is treated as categorization where every stimulus defines a category consisting of one member.

For a judgment of a target stimulus  $i$  on a quantitative dimension (e.g., evaluation), we assume that the perceiver forms a weighted average of the known values of all memory exemplars on that dimension. The weights are the similarity of the target to each memory exemplar. (An alternative, nonlinear functional form that would increase the weight of the most similar exemplars might be worthy of exploration.) Thus, exemplars that are highly similar to the target will have the most weight; the perceiver will assume that the target resembles them on the dimension in question. Exemplars that are very dissimilar to the target will have virtually no influence on the judgment. We chose this form for our model of judgment as the logical generalization of the context model's categorization process. Categorization can be considered a special case of judgment where the dimension is dichotomous (member of Category A or B).

<sup>1</sup> Nosofsky (1987) assumed that a target stimulus is compared to every known exemplar, with the most similar ones having more weight in identification or categorization decisions or in judgments. However, similar (and probably empirically indistinguishable) predictions follow from the alternative—and perhaps more intuitively appealing—assumption that only a few of the most similar exemplars are retrieved. Dissimilar exemplars would have little impact in either case, either because they are never retrieved or because their weight is near zero.

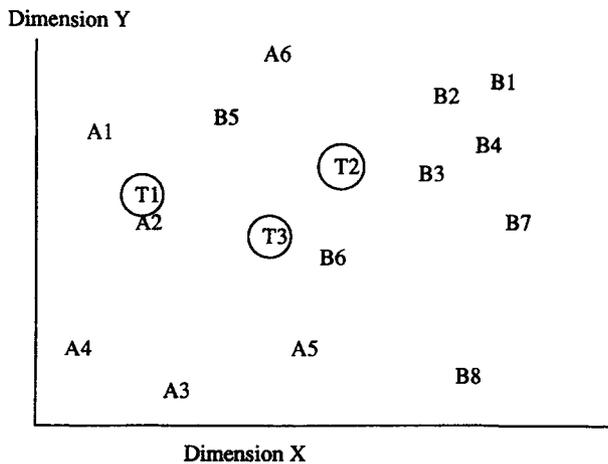


Figure 1. Representation of stimuli varying on two dimensions (X and Y) and belonging to two groups (A and B). (Target [T] Stimuli T1-T3 are to be categorized on the basis of their similarity to known members of Groups A and B.)

The aspects of the GCM just described are quite straightforward. The main complexity arises from the definition of *similarity* used earlier. Similarity between two stimuli is a weighted, interactive combination of the distances (differences) between the stimuli on the attribute dimensions being considered. The weight for each dimension depends on the perceiver's attention to that dimension, which will systematically vary across perceivers and situations for reasons to be outlined in detail. The interactive combination of distances on different dimensions, compared with additive, independent combination of information from the dimensions, makes the similarity rule sensitive to correlational structure among attributes and to the local density of categories (Medin, 1983; Medin & Schaffer, 1978).

Specifically, the similarity of two exemplars,  $i$  and  $j$ , is given by the following equations:

$$(\text{distance}) d_{ij} = \sum (w_m * |x_{im} - x_{jm}|)$$

and

$$(\text{similarity}) s_{ij} = \exp(-c * d_{ij}),$$

where the sum is taken over dimensions  $m$ ,  $w_m$  is the attentional weight for dimension  $m$ ,  $x_{im}$  is the location of exemplar  $i$  on dimension  $m$ , and  $c$  is a scaling parameter. Larger values of  $w_m$  for a dimension make differences between exemplars on that dimension loom larger and contribute more to overall dissimilarity; this property of the model is the key to most of the predictions developed in this article. Larger values of  $c$ , a parameter that Nosofsky (1987) assumed would increase with knowledge and experience with the stimulus domain, increase the general discriminability among the set of exemplars. Though Nosofsky (1987) has investigated various possible distance and similarity functions, he considered these equations appropriate when the stimulus dimensions are separable (i.e., perceptible as independent attributes, like gender and age) and the exemplars are relatively nonconfusable (i.e., easily seen to be nonidentical in a side-by-side comparison). The simulations presented in this

article use these formulas on the assumption that social stimulus dimensions and exemplars ordinarily have these properties.

Nosofsky's (1987) model assumes that differential attention to stimulus dimensions becomes effective at the time of retrieval (i.e., when the target is compared to known exemplars). However, attention could vary at the time those exemplars were first encountered as well. Exemplar attributes that received much attention may be highly elaborated and well represented, whereas others are only minimally encoded or are not present at all in the memory representation. The encoding specificity principle suggests that an exemplar is most likely to be retrieved when the same attributes that received most emphasis at encoding are the focus of the perceiver's attention at retrieval. So a representation of a teenaged male that emphasizes age information rather than gender would be more likely seen as similar to, and influence judgments about, a target teenager when the perceiver again focuses on age rather than on gender.

As an illustration, consider a young male, young female, and old male (Stimuli YM, YF, and OM, respectively). Figures 2 and 3 display the effect of the perceiver's attention to dimensions on the similarities among these stimuli. Figure 2 shows a high weight (much attention) given to gender, which magnifies differences in gender relative to age differences. Stimulus YM is seen as more similar to OM than to YF. Figure 3 shows a high weight on age, with YM now seen as more similar to YF than to OM. Prior research (e.g., Nosofsky, 1986) shows that attentional shifts like this can be produced by training subjects on category structures in which one or another stimulus attribute is a better cue to category membership (e.g., predicting membership in the National Organization for Women versus membership in the American Association of Retired People). A major focus of this article is to outline theoretical predictions for social, motivational, and contextual effects—not just effects of the immediate category structure—on attention to stimulus dimensions.

Researchers interested in social judgment have investigated a number of issues related to what information is used and how it is processed. These issues can be fruitfully encompassed within our framework, in which changes in attention to stimulus dimensions produce changes in perceived similarity among stimuli. For example, many researchers have considered the relative weight of categorical and individuating information in social

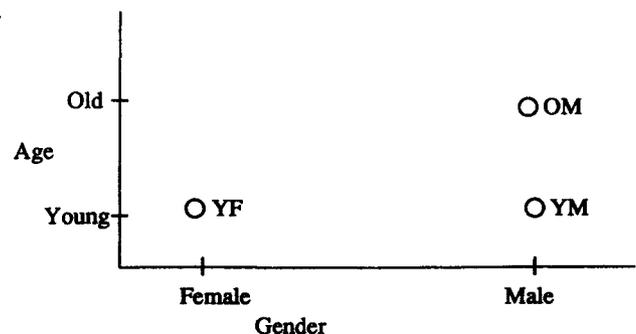


Figure 2. Three stimuli varying on age and gender, with much attention given to the gender dimension. (Stimulus YM [young male] is more similar to OM [old male] than to YF [young female].)

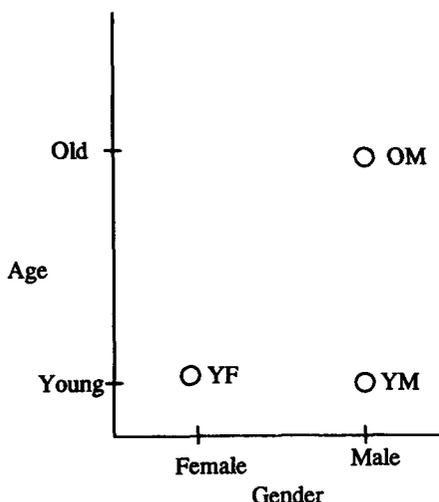


Figure 3. Three stimuli varying on age and gender, with much attention given to the age dimension. (Stimulus YM [young male] is more similar to YF [young female] than to OM [old male].)

judgment (Fiske & Neuberg, 1988; Locksley, Hepburn, & Ortiz, 1982). In making judgments about an individual, perceivers often rely on stereotypic information about the target's social category. However, some conditions (e.g., the provision of individuating information about the target) lead perceivers to lessen their reliance on stereotypes (Krueger & Rothbart, 1988). Brewer (1988) has proposed a fixed distinction between categorical and individuated modes of person perception, and others (e.g., Fiske & Neuberg, 1988; Turner, 1987) have proposed a more realistic view of a continuum between these two. These researchers have implicitly assumed that a single category (e.g., gender) is currently salient; other person attributes (e.g., personality traits, roles, or specific behaviors) therefore constitute individuating attributes that differentiate individuals within each category. (In another context, as we discuss shortly, occupational categories might be the focus of attention, with gender functioning as an individuating characteristic within occupations.)

In the current framework, the balance between attention to category-defining attributes and individuating attributes will determine the relative weight of individuating and categorical information in judgments. That is, more attention to attributes that define a specific category distinction will emphasize within-group similarities and between-groups differences and hence increase stereotypic perceptions (cf. Krueger, Rothbart, & Sriram, 1988; Turner, 1987, chapter 3). Attention to skin color and other race-correlated attributes means that all Blacks appear quite similar to each other, so the perceiver will tend to see them in stereotypic terms. In contrast, more attention to attributes that vary within each focal category (height, personality characteristics, and specific behaviors) will make individuals appear as unique and distinct.

Another issue that is gradually being recognized as important in the stereotyping literature is the category applied to a stimulus person who can be categorized in different ways (Messick & Mackie, 1989; Oakes & Turner, in press; Zárate & Smith,

1990). Multiple categories can be either horizontally overlapping (e.g., race, gender, age, or occupation) or vertically structured (e.g., woman or career woman). Many researchers have studied informational and motivational determinants of perceivers' use of hierarchically organized types and subtypes (e.g., Brewer, Dull, & Lui, 1981; Fiske & Neuberg, 1988). In the framework advanced here, attention to one dimension (e.g., gender), rather than to crosscutting (e.g., race) or subordinate dimensions (e.g., those defining gender subtypes), will determine the perceived similarity of the target stimulus to others (see Figures 2 and 3). This similarity in turn will determine whether the target is categorized and stereotyped by gender, by race, or by a gender subtype.

In our model the fundamental processes are differential attention to dimensions and exemplar retrieval. Categorization and stereotyping follow from these. For example, suppose a White woman who performs three relatively assertive behaviors is observed by someone who wishes to judge her degree of assertiveness. Different patterns of attention across these five attributes would yield different judgments. Attention directed mainly to gender would cause the target to be seen as similar to other women and to be judged in accordance with their known degree of assertiveness. Most likely the target would be judged as relatively unassertive if the perceiver had many representations of female exemplars with stereotypically low levels of assertiveness. One could say she was "categorized as female" but in our model categorization is not a separate processing step, just a convenient description of the idea that female exemplars were seen as most similar to the target and used to make judgments about her. Correspondingly, attention to the race dimension would lead to the target's being "categorized as White" and judged accordingly. Finally, predominant attention to the behavioral information would lead to the retrieval of exemplars who were known to have performed similar behaviors and hence to a judgment that the target is highly assertive. Thus, the major issues that have been considered in this literature, including the balance between individual- and category-level information in person perception and the question of what category is accessed, are special cases of the general issue of differential attention to stimulus attributes.

The GCM provides a systematic, unified, and quantitative framework that has been extremely successful in accounting for categorization and identification performance in nonsocial domains. It serves as the second of three basic postulates of the model outlined in this article: Exemplar retrieval and use in social judgment depends on similarity, which in turn depends on the perceiver's attention to the various stimulus dimensions (in the manner outlined by the GCM). We can suggest, then, that if a perceiver treats a stored representation of a teenaged male mugger as highly similar to other teenagers but not to other males, this is because the perceiver pays more attention to age than to gender in processing and encoding information about these stimulus persons. The next question is, obviously, why this pattern of attentional allocation exists. We now link a variety of specifically social influences (of situation, social context, motivation, or perceiver individual differences) to exemplar-based processing in social judgment, using the third proposition.

### Proposition 3: Attention to Stimulus Dimensions Depends on Social, Motivational, and Contextual Factors

Answering questions about why perceivers attend to some social dimensions (such as race and gender) and not to others requires going beyond the types of cognitive processes outlined earlier to enter the realm of social, motivational, and contextual factors. Effects of such factors on judgment have long been investigated in social psychology (McGuire, McGuire, Child, & Fujioka, 1978; Tajfel, 1978; Wilder, 1981) and to some extent in cognitive psychology (Barsalou, 1987; Roth & Shoben, 1983). For example, the relative numbers of members of two groups in the immediate social context, the perceiver's degree of prejudice, and cooperation or competition between groups all influence categorization and stereotyping along group lines. However, previous work—with the notable exception of Turner (1987)—has not put such diverse factors into a unifying theoretical framework. Turner's self-categorization perspective leads to some of the same hypotheses that are advanced here, though it makes no contact with research on basic exemplar representation or categorization processes (e.g., Medin & Schaffer, 1978).

Our exemplar-based model of judgment encompasses perceiver, contextual, informational, and motivational effects on social judgment by assuming that all such factors modulate stimulus similarity by affecting perceivers' allocation of attention to specific stimulus attributes. These factors will therefore influence which exemplars are weighted most heavily and hence how the target is categorized and judged. By assuming that social, motivational, and contextual effects share a common mechanism, this model brings their effects on social judgment into a single theoretical context, though each has been conceptualized in relative isolation in the past. In addition, this model of how these social factors affect judgments has implications for when social factors will affect judgments, suggesting hypotheses about the interactions of different factors and limiting conditions on their effects.

We expect that attention to stimulus dimensions will be highly variable over time and sensitive to subtle situational or contextual factors. Though some factors that influence attention (e.g., the perceiver's prior theories about what dimensions are important and predictive of social behavior) will be relatively stable, other factors (e.g., currently activated goals or motives) will vary from moment to moment. Moreover, different stimulus dimensions functionally compete with each other. As Turner (1987) postulated, with respect to a person's different social identities, more attention to one dimension will tend to reduce attention to others. In other words, a stimulus person will tend to be categorized in only one or a few ways—by role, gender, or race, for example (Zárate, 1990). All possible dimensions will not receive equal attention.

It is likely that simple perceptual factors exert some influence on perceivers' attention. Consider the salience and obviousness of cues to social categories like race, gender, and age compared with less perceptually obvious categories like occupation or sexual orientation. In most everyday encounters in which the perceiver is not motivated to gather extensive additional information about the target (Fiske & Neuberg, 1988), easily perceptible surface features will likely receive the bulk of the per-

ceiver's attention. Thus, targets will often be categorized in terms of such easily available attributes. However, ease of perception is not the whole story, for social and cultural factors shape the meanings attached to attributes like skin color. As we discuss later, for example, race will receive more attention for Black targets than for White targets, a difference that cannot be explained by purely perceptual factors. In addition, perceptually nonobvious attributes like sexual orientation, if they become known, will often receive much of the perceiver's attention.

In this section we go beyond effects of the perceptual characteristics of the stimulus to consider some of the possible broadly social influences on perceivers' attention to stimulus dimensions. We present computer simulations to illustrate qualitatively the model's prediction for several of the effects (see Appendix).

#### *Perceiver's Task or Goal*

Previous work with nonsocial stimuli shows that perceivers' attention to dimensions (and hence perceived similarity relationships among exemplars) depends on the categorization task at hand (Nosofsky, 1986). Stimulus dimensions that are better cues to category membership receive more attention. Thus, the perceiver's goal (to categorize stimuli in one way or another) influences attention and perceived similarity. For example, evaluating stimulus persons with the goal of choosing a study partner versus a date would be predicted to result in allocation of more attention (respectively) to intellectual versus social attributes of the targets. In general, an activated social motive, such as motives for affiliation, power, or sex, will increase the perceiver's attention to motive-relevant attributes of social stimulus persons (see Sorrentino & Higgins, 1986). Therefore, a target will be seen as similar to known exemplars who share those attributes rather than to those who share other, motive-irrelevant attributes; such exemplars will be used to make inferences and judgments about the target.

#### *Perceivers' Past Experience*

Perceivers may learn over a lifetime that certain dimensions are often important in categorizing people and hence chronically pay attention to such dimensions even if they are irrelevant for the specific task at hand. This constitutes a theory about social attributes and categories, of the sort that is cited by Medin (1989), as a key influence on perceivers' categorization and judgments. Attributes like age, gender, and race are powerful determinants of many important social roles and hence may be processed automatically by most adults in society (Brewer, 1988).

For example, men and women are unequally distributed into the roles of employee and homemaker, which are assumed to demand quite different psychological characteristics (Eagly & Steffen, 1984). People assume that employees are characterized by agentic qualities like task orientation and rationality and homemakers, by communal qualities like interpersonal orientation and empathy. How would a female employee be perceived? General experience might well lead perceivers to pay attention to gender even if it is locally irrelevant for categorization (e.g.,

among a group of male and female employees in an organization). Attention to gender, by exaggerating perceived differences along that dimension relative to other dimensions (as in Figure 2), would make female employees be seen as more similar to female homemakers than to male employees and so be attributed homemakers' typical traits (communal rather than agentic qualities). In short, it would cause perceivers to apply the traditional female stereotype. Conversely, attention to the role dimension would make female employees be seen as more similar to male employees than to female homemakers, so they would be seen as more agentic.

Our claim is that perceivers' general experience may cause them to allocate attention to, and hence exaggerate differences along, dimensions like gender that are often important in person perception and categorization. Turner (1987) has referred to these as accessible categories. If social change resulted in a more equal distribution of men and women among roles like employee and caretaking parent, for example, perceivers should allocate less attention to gender. Over time this would result in a general lessening of a tendency to see all women as similar and as very distinct from men.

The simulation outlined in Table 1 assumes that the perceiver knows about male employees (with an assumed high level of agentic qualities), about both male and female homemakers (with low levels of agency), and is confronted with a female employee target. With equal attentional weights on both dimensions (gender and role), the situation is symmetrical and the target's similarity to the male employee and to the female homemaker is equal. However, with a higher weight on gender due to the perceiver's theory about gender's importance, the female employee is seen as much more similar to the female homemaker and is judged to have low levels of agency. On the other hand, if the perceiver's attention is called to the role dimension, the female employee is seen as highly agentic. Differ-

Table 1  
*Gender and Social Roles (Target: Female Employee)*

Exemplar	Similarity	Identification probability
Equal attentional weights (.5 for gender, .5 for role)		
ME	.37	.42
MH	.14	.16
FH	.37	.42
Judged agentic = 4.38		
More weight on gender (.8 for gender, .2 for role)		
ME	.20	.20
MH	.14	.13
FH	.67	.67
Judged agentic = 2.60		
More weight on role (.2 for gender, .8 for role)		
ME	.67	.67
MH	.14	.13
FH	.20	.20
Judged agentic = 6.32		

Note. ME = male employee (agentic = 9); MH = male homemaker (agentic = 1); FH = female homemaker (agentic = 1).

Table 2  
*Self-Attributes (Target: Dependent and Dishonest)*

Exemplar	Similarity	Identification probability
Equal attentional weights (.5 for dependence, .5 for honesty)		
A1	.37	.42
A2	.14	.16
B1	.37	.42
Probability of categorization as A = .58		
Self-schematic for independence, weights (.8 for dependence, .2 for honesty)		
A1	.20	.20
A2	.14	.13
B1	.67	.67
Probability of categorization as A = .33		
Self-schematic for honesty, weights (.2 for dependence, .8 for honesty)		
A1	.67	.67
A2	.14	.13
B1	.20	.20
Probability of categorization as A = .80		

Note. A1 = independent and honest; A2 = independent and dishonest; B1 = dependent and honest.

ences in attention to social dimensions result in different inferences about the same target.

#### *Trait Chronicity and Perceiver's Self-Relevant Attributes*

Higgins (e.g., Higgins, King, & Mavin, 1982) has developed a model of *chronicity*, a perceiver's stable tendency to use a particular trait dimension in describing and evaluating other persons. One who is chronic for intelligence, for example, will tend to describe others in terms of their standing on that dimension, form impressions of other people's intelligence relatively quickly, and better remember intelligence-related behaviors than other behaviors (Bargh & Thein, 1985; Higgins et al., 1982). We therefore predict that perceivers who are chronically attuned to a dimension should give it more weight in perceived similarity. For Higgins, chronicity is developed by frequent use of the trait construct over time (see also Smith, 1989).

Self-relevant or self-schematic attributes also receive more processing by perceivers, even in other people (Fong & Markus, 1982; Lewicki, 1984). We predict that self-relevant attributes will function like chronically accessible attributes in person perception. That is, one who characteristically views himself or herself in terms of a trait like *independence* will pay attention to that dimension, exaggerating differences among stimulus exemplars along that dimension in comparison with differences on other dimensions. This pattern was empirically found by Tajfel and Wilkes (1964), who observed that subjects made more extreme judgments of others on those personality dimensions the subjects considered important.

The simulation in Table 2 simply illustrates the effect of being self-schematic for independence versus honesty, assumed to alter the dimension weights compared with a baseline condition of equal weights. A person who views himself or herself as

independent, for example, is less likely to classify the target as an *A* because the target differs from the known *As* on the important dimension of dependence–independence.

### *Frequency of Exposure*

In real life, social factors like propinquity and social network ties mean that a perceiver usually will be differentially familiar with different members of a group. Here we do not refer to the increasing familiarity with an individual member of a category (e.g., gay people) that would result from extensive personal interaction over time. Such interaction would have multiple and complex effects, including exposing the perceiver to the individual's personal counter-stereotypic attributes. Instead, we are referring simply to repeated exposure to easily perceptible exemplar attributes. For example, a group's designated leader or spokesperson might frequently appear in the media, whereas rank-and-file group members are rarely portrayed. Alternatively, specific types of group members might be encountered more frequently than others. People often have the impression that opposition to the Vietnam War was more extensive among the young than among the middle-aged and elderly. In fact, public opposition to the war was weakest among the young and strongest among the middle-age and elderly (Mueller, 1973, p. 139); people presumably drew their mistaken impression from the fact that youthful opponents of the war were prominent in media reports (e.g., of protests and of antiwar activities on college campuses).

In cases like these, frequently encountered stimuli, and other stimuli that are similar to them, become more accessible and more likely to be retrieved and to influence judgments (Nosofsky, 1988). For example, the attributes of the most familiar group member may shape people's impressions of the group as a whole. It may be that for most Americans, Dan Quayle is now subjectively perceived as a relatively typical member of the cate-

gory "Hoosier politician" and is the exemplar most readily retrieved if an evaluation of that group is to be given. This is the case even though objectively Quayle is not particularly typical of that group.

The simulation in Table 3 illustrates the effect of varying frequency of exposure to one particular exemplar (A1). In this simulation, as in Nosofsky (1988), each exposure to the exemplar is assumed to create a separate representation, consistent with a multiple-trace rather than a trace-strength approach to memory. With multiple instances of A1 in memory, both A1 itself and a similar test exemplar (at Location 2, 2) are categorized as *As* with higher probability, and are seen as more representative of Category A.

### *In-Group/Out-Group Dynamics*

The perceiver's own characteristics play a role in person perception by defining in-groups and out-groups (Tajfel & Turner, 1985). Zárate and Smith (1990) found in-group/out-group effects in a social categorization task, in which subjects categorized stimulus photographs by gender or by race. In two experiments, subjects classified same-sex photos by sex faster than opposite-sex photos.<sup>2</sup> These results are related to those of Brigham and Barkowitz (1978), who found that Black and White subjects are more accurate in recognizing same-race targets than other-race targets. Using still another dependent measure, Park and Rothbart (1982, Experiment 4) presented subjects with short stories about numerous individuals and later asked subjects to recall all they could remember about the targets' characteristics. They found that subjects' memory for individuating details (e.g., occupation) was better for same-sex targets than for opposite-sex targets. Finally, it is well-known that out-group members are viewed as more similar to each other than are in-group members (Judd & Park, 1988; Linville et al., 1989; Park & Rothbart, 1982).

The most fundamental implication of these findings lies in the demonstration that the self (specifically, one's own social category membership) influences social categorization processes. This is the central postulate of social identity theory (Tajfel, 1982; Turner, 1987): that many aspects of social judgment and behavior are driven by implications of group memberships for one's own social identity. These findings also suggest a clear prediction for application of this exemplar-based model to social judgment in an in-group/out-group context. More attention is devoted to the individuating (non-category-defining) attributes of the self and fellow in-group members, and more to the category-defining attributes of out-group members. For example, a man processing a female target would pay attention to gender, thereby perceiving her as relatively simi-

Table 3  
*Effect of Differential Frequency of Exposure*  
*(in One or Five Instances)*

Exemplars	Value of friendliness	Value of intelligence
A1	1	2
A2	2	3
A3	4	2
B1	1	1
B2	2	1
B3	3	1
T	2	2

Target	Probability of categorization as A	Representativeness as an A
One exposure to A1		
T	0.58	1.36
A1	0.68	2.14
Five exposures to A1		
T	0.79	3.67
A1	0.90	9.38

Note. T = target.

<sup>2</sup> In this study the in-group/out-group effect found for gender was not replicated for subject race. This may simply reflect the study's lower power to detect race differences (because we were able to obtain few Black subjects). In addition, because of the functional opposition of different stimulus dimensions, one would not expect both gender and race to be highly salient to subjects at the same time. Perhaps subjects' own expectations or their perceptions of the experimental situation cued them to pay more attention to gender than to race in the conditions of this study.

lar to other women (out-group homogeneity) and in particular as similar to housewives (thus viewing her in stereotypic, communal terms; Eagly & Steffen, 1984). Conversely, a man perceiving a male target would devote more attention to his other attributes (occupation and traits), perhaps because less time is required to process the in-group gender attribute (Zárate & Smith, 1990). This attention allocation would result both in perceptions that men are quite diverse and in better memory for their individuating attributes (Park & Rothbart, 1982). Though the GCM of Nosofsky (1987) assumes that attention to a given dimension (e.g., gender) is constant across stimuli, Medin and Edelson (1988) have proposed a version in which attention to a dimension can vary depending on the other attributes of the stimulus, the same assumption that appears to be called for here.

Table 4 illustrates that the encoding of additional attributes (beyond group membership itself and gender) will generally lower exemplar-to-exemplar similarity. If more attributes are encoded for in-group than for out-group members, the out-group will be seen as relatively homogeneous.

Messick and Mackie (1989, p. 56), Mullen (1991), and Turner (1987) adopted different versions of the assumption that in-group and out-group members are processed differently. We do not assume that the representation is dichotomous (e.g., the out-group represented by a prototype, and in-group members as exemplars). Instead, we specify a common representation (all groups are represented by exemplars), with the qualification that differential attention and encoding processes alter the representation of those exemplars so that out-group members appear more similar to each other because their individuating attributes receive less attention.

### Cultural "Default" Values

Within a culture, particular person attributes may come to be perceived as expected or default values. For example, in Western culture it has been claimed that male gender, White racial identity, nonhandicapped physical status, heterosexual orientation, and young age are treated as cultural expectations, assumed to characterize a person if no dimension-relevant information is explicitly provided (Eagly & Kite, 1987; Goffman, 1963). If a cultural default exists, a departure from the expected attribute value will be likely to attract attention and be the basis

for categorizing the target. We have obtained evidence for this process, using two different dependent variables.

Zárate and Smith (1990) reported three studies that measure the speed of categorizing photographs of people along various dimensions (White, Black, male, or female). This measure can be used to reveal the specific categorization that people use when more than one is applicable to a target individual (as is always the case with real people). Results show that targets who differ from a cultural default of White and male are categorized according to that deviation. Thus, Black men are categorized as Black rather than as male; White women are categorized as female, not as White.

The frequency estimation study of Zárate (1990), described earlier, provides additional evidence for the cultural default (White male) hypothesis. Subjects who saw extra photos of Black men were predicted to encode them as *Black* rather than as *male*, because only the racial categorization departs from a cultural default value. As predicted, in this condition estimates of the number of Blacks significantly exceeded the number of men (in reality, equal numbers of Blacks and men were seen in this condition). Likewise, when extra photos of White females were included (which should be encoded as *female* rather than as *White*), subjects did estimate that they saw more women than Whites. Thus, these results suggest that subjects encoded the nondefault attribute of a photo in preference to default values.

This research, then, suggests that perceivers preferentially attend to attributes that depart from a culturally defined default of White and male. The asymmetrical treatment of culturally default and nondefault attributes means that members of a nondefault category, like out-group members, will be seen as more homogeneous because they share the category-defining attribute that is prominent in the perceiver's representation. They will also be more readily stereotyped, and attitudes will be more readily generalized from one to other members of that category. Quattrone and Jones (1980), Nisbett, Krants, Jepson, and Kunda (1983), and Wilder (1978) all demonstrated that stereotypic inferences are more probable for categories perceived as more homogeneous (e.g., out-groups as compared with in-groups), as we would predict. For example, learning that a handicapped person has embezzled from his or her employer may lead a perceiver to expect dishonesty from other handicapped persons, whereas the same behavior performed by a nonhandicapped person would have a minimal impact on the perceiver's expectations about the nonhandicapped. Also, perceptual and memorial confusions among members of nondefault categories should be more likely than among members of default categories.

The simulation in Table 5 illustrates that the perceiver has stored exemplars of all four possible (Gender  $\times$  Role) types and that assumed levels of agentic qualities are perfectly correlated with role (not with gender). A male employee will be assumed to possess relatively high levels of agentic qualities, for the most similar exemplar is the known male employee. Encountering a female employee is assumed to change the attentional weights because female gender is culturally defined as nondefault. The female employee with an agentic value of 9 is still the most similar, but female homemakers are also seen as highly similar to this target because of the attentional shift, so the female

Table 4  
*Out-Group Homogeneity*

Exemplar	Characteristics
A1	Out-group male
A2	Out-group male
A3	Out-group female
B1	In-group male, intelligence = 2, height = 6
B2	In-group female, intelligence = 4, height = 3
B3	In-group female, intelligence = 6, height = 3

Average similarity among out-group members = 0.74  
Average similarity among in-group members = 0.15

Table 5  
Cultural Default Values

Exemplar	Similarity	Identification probability
Target: male employee; equal dimension weights (.5 for gender, .5 for role)		
ME	1.00	.53
FE	.37	.20
MH	.37	.20
FH	.14	.07
Judged agentic = 6.85		
Target: female employee; more weight on gender (.8 for gender, .2 for role)		
ME	.20	.10
FE	1.00	.50
MH	.14	.07
FH	.67	.33
Judged agentic = 5.79		

*Note.* Varying numbers, keeping dimension weights at .5, .5. Assume five male employees, three female employees, one male homemaker, and three female homemakers. For the male employee target, judged agentic = 8.10; for the female employee target, judged agentic = 7.37. ME = male employee (agentic = 9); FE = female employee (agentic = 9); MH = male homemaker (agentic = 1); FH = female homemaker (agentic = 1).

employee is judged to have lower levels of agency than the male employee.

The note to Table 5 describes a different type of effect, related to differential familiarity (discussed earlier). Here, attentional weights are assumed to be unbiased, but men and women are assumed to be distributed into social roles in different proportions (Eagly, 1987). Note again that male employees will be expected to have higher levels of agentic qualities, whereas female employees appear relatively similar to female homemakers. The greater numbers of female homemakers than of male homemakers means that homemakers' assumed low levels of agentic qualities will have a greater impact on the perception of a female than of a male employee. Of course, this effect of familiarity and the previously illustrated effect of greater attention to gender for a female target could both operate together, producing an even stronger effect.

### Numbers in the Social Context

Numerical relationships can influence intergroup perceptions and behavior (Mullen, 1991; Taylor & Fiske, 1978). When one category is larger than another (e.g., more men than women) and particularly when a minority is so small as to constitute a "token" one or two individuals, the dimension becomes highly salient relative to the case of a more equal split (Taylor & Fiske, 1978). These findings suggest (in terms of the current model) that as the sizes of two groups become more unequal, more attention will be paid to dimensions that differentiate them. This implies that the two groups will be seen as more different from each other, whereas perceived within-group similarity should increase.

A second prediction is parallel to that for in-groups and out-

groups. Members of a minority group are generally seen as more similar to each other than are members of a majority (e.g., Mullen, 1991; Simon & Brown, 1987). Thus, observers give more attention to individuating or non-category-defining attributes of the majority (like in-group members) and more attention to the category-defining attribute of the minority (like out-group members). This has implications for social inference processes; for example, an attribute should be generalized from one minority-group member to another more readily than from one majority-group member to another. (No simulation of these predictions is presented, for they parallel those for in-groups and out-groups, already shown.) Effects of the social situation or context on social judgments pose particular problems for attribute-based or schematic models of judgments. Because these models hold that judgment depends on abstract, general knowledge structures, it should be relatively stable across contexts as well as over time. In contrast, by incorporating the possibility of rapidly shifting, situationally determined attention to stimulus dimensions, this exemplar-based model allows for changes in judgment over time. Even if the perceiver's store of exemplar knowledge does not change, the set of exemplars that are seen as most similar to a target (and hence weighted most heavily in judgments) will change as the focus of attention is altered.

We have now illustrated three separate but related effects: Members of an out-group, of a category culturally defined as nondefault, and of a minority in the local context are all processed in terms of their category-defining attributes rather than in terms of their individuating characteristics. Often these three effects will overlap and reinforce each other, as when a White views a Black (a member of a culturally nondefault out-group) in a situation where Blacks constitute a small minority. However, the effects can also be put into conflict. Our data contain hints that cultural defaults outweigh effects of the perceiver's own group membership. For example, Black subjects did not differ from Whites in their categorization speeds in our one study that involved Black subjects (Zárate & Smith, 1990, Experiment 1), but this conclusion must be highly tentative because of low power. In general, the relative strength of these three effects and the conditions under which each predominates remain to be determined.

### Stimulus Characteristics

Social learning often creates knowledge representations at the level of social categories rather than at the level of individuals. Someone might be told that all labor union leaders are corrupt, that all Palestinians are terrorists, or that "big boys don't cry," for instance, even in the absence of supportive experience with specific exemplars (see Messick & Mackie, 1989, p. 48). In fact, a socially learned group stereotype could be contradicted by the majority of the individual's experiences with specific group members, a possibility that presumably could not arise if group-level knowledge was acquired only by induction from specific exemplars. Certainly the "bigot with the heart of gold," who dislikes an out-group as a generality but is personally accepting of individual out-group members, is a stock figure in popular culture (as is the opposite, professedly nonracist but personally intolerant type). Of course, if a perceiver possesses mixed and inconsistent group-level and exemplar-level

representations, the issue of which representation is accessed and used to make any particular judgment comes to the fore.

Because we assume that similarity to a stimulus determines the weight of known instances in judgment, the nature of the stimulus the perceiver is reacting to is one potential determinant. In particular, a verbal label for a group (like *Blacks*) may be more likely seen as similar to group-level representations, and a specific individual more likely to retrieve other persons (exemplars). This is because a group label is semantically linked to group-level attributes, whereas a specific individual will always have non-group-specific, individuating attributes as well (height, eye color, specific behaviors, occupation, and clothing style). On the assumption that representations of groups often contain stereotypic negative information, whereas encounters with individual group members are mostly benign, this hypothesis is consistent with the person positivity effect found by Sears (1983). For example, Sears pointed out that most Americans express a highly negative view concerning Congress, while routinely reelecting their own congressional representatives at a rate approaching 100%.

Of course, there cannot be complete independence between knowledge about groups and knowledge about individual group members. Perceivers may sometimes access their group-level knowledge when thinking about or evaluating an individual (e.g., "I think well of my Congressperson, but the Congress as a whole has not been doing very well on the nation's problems—maybe it's time for a change"); group-level information may be used to interpret ambiguous exemplar information, as when a group member's ambiguous behavior comes to be seen in stereotype-consistent terms (Darley & Gross, 1983). This may be particularly likely when the perceiver has few or no specific exemplars stored in memory but has strong and easily accessible group-level knowledge. This might be the situation of a young child in his or her first encounters with members of a racial out-group in public school. Unfortunately, access of negative group-level knowledge in this situation can lead to a self-perpetuating stereotype, as specific individuals are inferred to have group-typical negative characteristics and are stored as negative specific exemplars of the group.

Our perspective, together with the logic just outlined, has significant implications for the assessment of stereotypes. From the classic study of Katz and Braly (1933) to studies of the present day (e.g., Deaux & Lewis, 1984; Devine, 1989), most researchers have provided subjects with verbal group labels as stimuli to assess their group stereotypes. It is possible that such measurement techniques will assess knowledge structures that are real but are not those accessed by the perceivers in everyday encounters with individual group members. There is a real need for the development of assessment techniques that can reveal what exemplars or other knowledge structures are accessed when a real person is the cue—perhaps along the lines pioneered by Malt (1989). Unfortunately, the GCM points to some complexities in that effort: Exemplar retrieval and use will depend on perceived similarity, which in turn varies with the current focus of attention, contextual salience, perceivers' individual differences, and the like.

### Summary

Social influences, including the perceiver's past experiences, self-attributes, group memberships, and the social context,

should influence attention to stimulus dimensions, perceptions of exemplar similarity, and the retrieval and use of exemplars in social judgment, person perception, and stereotyping. This conceptualization encompasses a number of much-studied issues regarding social judgment. These include the relative weight of individuating versus category-level information in social judgments, the question of how a target is categorized (among horizontally overlapping and vertically hierarchical categories), and perceptions of the relative homogeneity of out-groups and minorities.

Other social influences on judgment might also be candidates for incorporation within the framework. Intergroup conflict or competition can sharpen the salience of group-linked attributes (Brewer, 1979; Judd & Park, 1988), increasing perceived within-group similarity and between-groups differences (Turner, 1987). Outcome dependency and other motivational factors can cause perceivers to pay attention to and individuate specific others on whom they are dependent (Messick & Mackie, 1989, p. 57; Neuberg & Fiske, 1987).

As a concrete illustration of our model's application to stereotyping, consider the possibility that some racially prejudiced people may not have negative attitudes toward, or stereotypic beliefs about, Blacks *per se*. Perhaps such individuals (a) pay much attention to race when perceiving Black targets because Blacks constitute an out-group, are culturally defined as nondefault, and are a minority; (b) therefore, they see Blacks as relatively homogeneous; and (c) they have available exemplars of a few Black criminals, perhaps learned through the media. Then the average Black stimulus person encountered on the street, perhaps, would trigger the retrieval and use of those exemplars, leading to a negative attitude and to expectations of criminal conduct. In another context (e.g., watching Bill Cosby on television) a different set of exemplars (e.g., other comedians) might be retrieved, because the context makes role more salient than race. This type of analysis, then, suggests that racial attitudes may be markedly context sensitive. In fact, it has been found that if a workplace is racially desegregated, White workers often become more accepting of Black co-workers—but without changing their negative attitudes toward Blacks in other contexts (e.g., toward neighborhood or school desegregation; Minard, 1952). If some instances of stereotypic beliefs and prejudiced attitudes stem from this mechanism, it would theoretically be possible to remedy them by increasing the importance of other dimensions in the perceiver's view. Increasing the salience of crosscutting dimensions is known to reduce intergroup bias in minimal intergroup situations (Deschamps & Doise, 1978), consistent with this suggestion.

### Conclusions

Jean-Paul Sartre described a woman who says she hates Jews because of her bad experiences with Jewish furriers. "Why did she choose to hate Jews rather than furriers? Why Jews or furriers rather than such and such a Jew or such and such a furrier?" (cited in Rothbart, 1981, p. 156). The model presented in this article offers an answer to this question. The woman paid much attention to the Jew/non-Jew dimension, so that she saw all Jews as quite similar to each other (and quite different from non-Jews). Therefore, her negative representations of the

furrer exemplars were retrieved and used to formulate judgments and evaluations when she thought about any Jew. Of course, this answer is not complete, for it does not explain why this particular dimension (e.g., rather than occupation) received such attention in the first place. A full analysis at this level would have to cover many of the cultural, social, economic, historical, and theological roots of anti-Semitism in Western culture. However, but with the insights of the exemplar-based model presented in this article, we can at least suggest several contributing factors. The woman is likely not herself a Jew (so that Jews form an out-group that is perceived as relatively homogeneous). Jews are probably a minority in her social environment (again, making them seem homogeneous). Jews are probably culturally defined as nondefault (e.g., perhaps the state officially supports another religion); and Jews are probably segregated into specific social roles (so that perceivers learn to focus on ethnic identity as a significant and meaningful predictor of social behaviors).

Current models of social judgment emphasize either the weighting and linear combination of attributes into an overall judgment or abstract schematic knowledge structures that are accessed and used in addition to information drawn from the current stimulus; but these models cannot account for several types of effects, as we have noted throughout this article. This article advances an alternative conceptualization of the nature of the social knowledge that is drawn on and the processes by which it is applied in social judgment and person perception. Exemplar representations (i.e., representations of specific persons) are stored in memory and retrieved in the process of making social judgments (see Lewicki, 1986). Exemplar storage and retrieval constitutes a type of implicit memory, largely independent from explicit measures of memory such as recall or recognition. The weight of known exemplars in judgment depends on similarity between the current focal stimulus and exemplars stored in memory. Similarity is not a fixed and context-independent property but is modulated by the perceiver's attention to stimulus dimensions (Medin & Schaffer, 1978). More attention to a dimension results in the accentuation of differences along that dimension compared with other dimensions. Finally, attention to stimulus dimensions depends on a range of social and motivational factors, including individual differences, the perceiver's past experiences, the self-schema, the current social context, in-group/out-group dynamics, and the like—not just on the immediate task.

This integrative framework can incorporate the effects of social, individual, and situational independent variables. These include perceivers' past experiences, their own attributes (and hence in-group/out-group differences), and contextual influences (such as relative numbers). Such variables influence key processes in social categorization, person perception, and social judgment, like the relative weight of individual vs. categorical information in judgments, and the question of which applicable category is actually accessed. The model thus points to the inextricable relationships between the personal and social aspects of the perceiver's self and situation and the cognitive representations and processes that underlie social judgments. Only such an integrative model has the potential to encompass the complex, multiply determined phenomena involved in so-

cial categorization, stereotyping, person perception, and social judgment.

## References

- Alba, J., & Hasher, L. (1983). Is memory schematic? *Psychological Bulletin*, *93*, 203–231.
- Andersen, S. M., & Cole, S. W. (1990). "Do I know you?" The role of significant others in general social perception. *Journal of Personality and Social Psychology*, *59*, 384–399.
- Anderson, N. H. (1981). *Foundations of information integration theory*. San Diego, CA: Academic Press.
- Bargh, J. A., & Thein, R. D. (1985). Individual construct accessibility, person memory, and the recall-judgment link: The case of information overload. *Journal of Personality and Social Psychology*, *49*, 1129–1146.
- Barsalou, L. W. (1987). The instability of graded structure: Implications for the nature of concepts. In U. Neisser (Ed.), *Concepts and conceptual development* (pp. 101–140). Cambridge, England: Cambridge University Press.
- Begg, I., Armour, V., & Kerr, T. (1985). On believing what we remember. *Canadian Journal of Behavioral Science*, *17*, 199–214.
- Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analyses. *Psychological Bulletin*, *86*, 307–323.
- Brewer, M. B. (1988). A dual process model of impression formation. In R. S. Wyer & T. K. Srull (Eds.), *Advances in social cognition* (Vol. 1, pp. 1–36). Hillsdale, NJ: Erlbaum.
- Brewer, M. B., Dull, V. T., & Lui, L. (1981). Perceptions of the elderly: Stereotypes as prototypes. *Journal of Personality and Social Psychology*, *41*, 656–670.
- Brigham, J. C., & Barkowitz, P. (1978). Do "they all look alike?" The effect of race, sex, experience, and attitudes on the ability to recognize faces. *Journal of Applied Social Psychology*, *8*, 306–318.
- Brooks, L. R. (1987). Decentralized control of cognition: The role of prior processing episodes. In U. Neisser (Ed.), *Concepts and conceptual development* (pp. 141–174). Cambridge, England: Cambridge University Press.
- Cantor, N., & Mischel, W. (1977). Traits as prototypes: Effects on recognition memory. *Journal of Personality and Social Psychology*, *35*, 38–48.
- Darley, J. M., & Gross, P. H. (1983). A hypothesis-confirming bias in labeling effects. *Journal of Personality and Social Psychology*, *44*, 20–33.
- Deaux, K. K., & Lewis, L. L. (1984). Structure of gender stereotypes: Interrelationships among components and gender label. *Journal of Personality and Social Psychology*, *46*, 991–1004.
- Deschamps, J. C., & Doise, W. (1978). Crossed category memberships in intergroup relations. In H. Tajfel (Ed.), *Differentiation between social groups* (pp. 141–158). San Diego, CA: Academic Press.
- Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, *56*, 5–18.
- Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation*. Hillsdale, NJ: Erlbaum.
- Eagly, A. H., & Kite, M. E. (1987). Are stereotypes of nationalities applied to both women and men? *Journal of Personality and Social Psychology*, *53*, 451–462.
- Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology*, *46*, 735–754.
- Fazio, R. H. (1986). How do attitudes guide behavior? In R. M. Sorren-

- tino & E. T. Higgins (Eds.), *Handbook of motivation and cognition* (pp. 204–243). New York: Guilford Press.
- Fiske, S. T., & Neberg, S. L. (1988). A continuum model of impression formation: From category-based to individuating processes as a function of information, motivation, and attention. *Advances in Experimental Social Psychology*, 23, 1–74.
- Fiske, S. T., Neberg, S. L., Beattie, A. E., & Milberg, S. J. (1987). Category-based and attribute-based reactions to others: Some informational conditions of stereotyping and individuating processes. *Journal of Experimental Social Psychology*, 23, 399–427.
- Fong, G. T., & Markus, H. (1982). Self-schemas and judgments about others. *Social Cognition*, 1, 191–204.
- Gilovich, T. (1981). Seeing the past in the present: The effect of associations to familiar events on judgments and decisions. *Journal of Personality and Social Psychology*, 40, 797–808.
- Goffman, E. (1963). *Stigma*. Englewood Cliffs, NJ: Prentice-Hall.
- Hanson, C., & Hirst, W. (1988). Frequency encoding of token and type information. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 289–297.
- Hasher, L., Goldstein, D., & Toppino, T. (1977). Frequency and the conference of referential validity. *Journal of Verbal Learning and Verbal Behavior*, 16, 107–112.
- Higgins, E. T., & Bargh, J. A. (1987). Social cognition and social perception. *Annual Review of Psychology*, 38, 369–427.
- Higgins, E. T., King, G. A., & Mavin, G. H. (1982). Individual construct accessibility and subjective impressions and recall. *Journal of Personality and Social Psychology*, 43, 35–47.
- Hintzman, D. L. (1986). "Schema abstraction" in a multiple-trace memory model. *Psychological Review*, 93, 411–428.
- Holyoak, K. J., & Koh, K. (1987). Surface and structural similarity in analogical transfer. *Memory and Cognition*, 15, 332–340.
- Jacoby, L. L. (1983). Perceptual enhancement: Persistent effects of an experience. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9, 21–38.
- Jacoby, L. L., Allan, L. G., Collins, J. C., & Larwill, L. K. (1988). Memory influences subjective experience: Noise judgments. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 240–247.
- Jacoby, L. L., Baker, J. G., & Brooks, L. R. (1989). Episodic effects on picture identification: Implications for theories of concept learning and theories of memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 275–281.
- Jacoby, L. L., & Kelley, C. M. (1987). Unconscious influences of memory for a prior event. *Personality and Social Psychology Bulletin*, 13, 314–336.
- Jacoby, L. L., Kelley, C. M., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology*, 56, 326–338.
- Judd, C. M., & Park, B. (1988). Out-group homogeneity: Judgments of variability at the individual and group levels. *Journal of Personality and Social Psychology*, 54, 778–788.
- Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, 93, 136–153.
- Katz, D., & Braly, K. (1933). Racial stereotypes in one hundred college students. *Journal of Abnormal and Social Psychology*, 28, 280–290.
- Krueger, J., & Rothbart, M. (1988). The use of categorical and individuating information in making inferences about personality. *Journal of Personality and Social Psychology*, 55, 187–195.
- Krueger, J., Rothbart, M., & Sriram, N. (1988). Category learning and change: Differences in sensitivity to information that enhances or reduces intercategory distinctions. *Journal of Personality and Social Psychology*, 56, 866–875.
- Lewicki, P. (1984). Self-schema and social information processing. *Journal of Personality and Social Psychology*, 47, 1177–1190.
- Lewicki, P. (1986). *Nonconscious social information processing*. San Diego, CA: Academic Press.
- Linville, P. W., Fischer, G. W., & Salovey, P. (1989). Perceived distributions of the characteristics of in-group and out-group members: Empirical evidence and a computer simulation. *Journal of Personality and Social Psychology*, 57, 165–188.
- Locksley, A., Hepburn, C., & Ortiz, V. (1982). Social stereotypes and judgments of individuals: An instance of the base-rate fallacy. *Journal of Experimental Social Psychology*, 18, 23–42.
- Logan, G. D. (1988). Toward an instance theory of automatization. *Psychological Review*, 95, 492–527.
- Luce, R. D. (1963). Detection and recognition. In R. D. Luce, R. R. Bush, & E. Galanter (Eds.), *Handbook of mathematical psychology* (pp. 103–189). New York: Wiley.
- Malt, B. C. (1989). An on-line investigation of prototype and exemplar strategies in classification. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 539–555.
- Mandler, G., Nakamura, Y., & Van Zandt, B. J. S. (1987). Nonspecific effects of exposure on stimuli that cannot be recognized. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 646–648.
- McClelland, J. L., & Rumelhart, D. E. (1985). Distributed memory and the representation of general and specific information. *Journal of Experimental Psychology: General*, 114, 159–188.
- McGuire, W. J., McGuire, C. V., Child, P., & Fujioka, T. (1978). Salience of ethnicity in the spontaneous self-concept as a function of one's ethnic distinctiveness in the social environment. *Journal of Personality and Social Psychology*, 15, 511–520.
- Medin, D. L. (1983). Structural principles in categorization. In T. J. Tighe & B. E. Shepp (Eds.), *Perception, cognition, and development: Interactional analysis* (pp. 203–230). Hillsdale, NJ: Erlbaum.
- Medin, D. L. (1989). Concepts and conceptual structure. *American Psychologist*, 44, 1469–1481.
- Medin, D. L., Altom, M. W., & Murphy, T. D. (1984). Given versus induced category representations: Use of prototype and exemplar information in classification. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 10, 333–352.
- Medin, D. L., Dewey, G. I., & Murphy, T. D. (1983). Relationships between item and category learning: Evidence that abstraction is not automatic. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9, 607–625.
- Medin, D. L., & Edelson, S. M. (1988). Problem structure and the use of base-rate information from experience. *Journal of Experimental Psychology: General*, 117, 68–85.
- Medin, D. L., & Schaffer, M. M. (1978). Context theory of classification learning. *Psychological Review*, 85, 207–238.
- Medin, D. L., & Smith, E. E. (1981). Strategies and classification learning. *Journal of Experimental Psychology: Human Learning and Memory*, 7, 241–253.
- Messick, D. M., & Mackie, D. M. (1989). Intergroup relations. *Annual Review of Psychology*, 40, 45–81.
- Minard, R. D. (1952). Race relations in the Pocahontas coal field. *Journal of Social Issues*, 8, 29–44.
- Mitchell, D. B., & Brown, A. S. (1988). Persistent repetition priming in picture naming and its dissociation from recognition memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 213–222.
- Mueller, J. E. (1973). *War, presidents, and public opinion*. New York: Wiley.
- Mullen, B. (1991). Group composition, salience, and cognitive repre-

- sentations: The phenomenology of being in a group. *Journal of Experimental Social Psychology*, 27, 297–323.
- Neuberg, S. L., & Fiske, S. T. (1987). Motivational influences on impression formation: Outcome dependency, accuracy driven attention, and individuating processes. *Journal of Personality and Social Psychology*, 53, 431–444.
- Nisbett, R. E., Krants, D. H., Jepson, C., & Kunda, Z. (1983). The use of statistical heuristics in everyday intuitive reasoning. *Psychological Review*, 90, 339–363.
- Nosofsky, R. M. (1986). Attention, similarity, and the identification–categorization relationship. *Journal of Experimental Psychology: General*, 115, 39–57.
- Nosofsky, R. M. (1987). Attention and learning processes in the identification and categorization of integral stimuli. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 87–108.
- Nosofsky, R. M. (1988). Similarity, frequency, and category representations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 54–65.
- Nosofsky, R. M., Clark, S. E., & Shin, H. J. (1989). Rules and exemplars in categorization, identification, and recognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 282–304.
- Novick, L. R. (1988). Analogical transfer, problem similarity, and expertise. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 510–520.
- Oakes, P. J., & Turner, J. C. (in press). Is limited information processing capacity the cause of social stereotyping? In M. Hewstone & W. Stroebe (Eds.), *European review of social psychology* (Vol. 1). Chichester, England: Wiley.
- Park, B., & Hastie, R. (1987). Perception of variability in category development: Instance versus abstraction-based stereotypes. *Journal of Personality and Social Psychology*, 53, 621–635.
- Park, B., & Rothbart, M. (1982). Perception of out-group homogeneity and levels of social categorization: Memory for the subordinate attributes of in-group and out-group members. *Journal of Personality and Social Psychology*, 42, 1051–1068.
- Posner, M. I., & Keele, S. W. (1968). On the genesis of abstract ideas. *Journal of Experimental Psychology*, 77, 353–363.
- 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.
- Read, S. J. (1987). Similarity and causality in the use of social analogies. *Journal of Experimental Social Psychology*, 23, 189–207.
- Reed, S. K. (1972). Pattern recognition and categorization. *Cognitive Psychology*, 3, 382–407.
- Roth, E. M., & Shoben, E. J. (1983). The effect of context on the structure of categories. *Cognitive Psychology*, 15, 346–378.
- Rothbart, M. (1981). Memory processes and social beliefs. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior* (pp. 145–181). Hillsdale, NJ: Erlbaum.
- Rothbart, M., & John, O. P. (1985). Social categorization and behavior episodes: A cognitive analysis of the effects of intergroup contact. *Journal of Social Issues*, 41(3), 81–104.
- Rothbart, M., & Lewis, S. (1988). Inferring category attributes from exemplar attributes: Geometric shapes and social categories. *Journal of Personality and Social Psychology*, 55, 861–872.
- Schacter, D. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 501–518.
- Seamon, J. G., Brody, N., & Kauff, D. M. (1983). Affective discrimination of stimuli that are not recognized: Effects of shadowing, masking, and cerebral laterality. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9, 544–555.
- Sears, D. O. (1983). The person–positivity bias. *Journal of Personality and Social Psychology*, 44, 233–250.
- Sherman, S. J., & Corty, E. (1984). Cognitive heuristics. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 1, pp. 189–286). Hillsdale, NJ: Erlbaum.
- Simon, B., & Brown, R. (1987). Perceived homogeneity in minority–majority contexts. *Journal of Personality and Social Psychology*, 53, 703–711.
- Smith, E. R. (1989). Procedural efficiency: General and specific components and effects on social judgment. *Journal of Experimental Social Psychology*, 25, 500–523.
- Smith, E. R. (1990). Content and process specificity in the effects of prior experiences [Target article]. In T. K. Srull & R. S. Wyer (Eds.), *Advances in social cognition* (Vol. 3, pp. 1–59). Hillsdale, NJ: Erlbaum.
- Smith, E. R. (1991). Illusory correlation in a simulated exemplar-based memory. *Journal of Experimental Social Psychology*, 27, 107–123.
- Smith, E. R., & Branscombe, N. R. (1988). Category accessibility as implicit memory. *Journal of Experimental Social Psychology*, 24, 490–504.
- Smith, E. R., Stewart, T., & Buttram, R. (in press). Inferring a trait from a behavior has long-term, highly specific effects. *Journal of Personality and Social Psychology*.
- Smith, E. R., & Zárate, M. A. (1990). Exemplar and prototype use in social categorization. *Social Cognition*, 8, 243–262.
- Sorrentino, R. M., & Higgins, E. T. (1986). Motivation and cognition: Warming up to synergism. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition* (pp. 3–19). New York: Guilford Press.
- Tajfel, H. (1978). *Differentiation between social groups*. San Diego, CA: Academic Press.
- Tajfel, H. (1982). The social psychology of intergroup relations. *Annual Review of Psychology*, 33, 1–39.
- Tajfel, H., & Turner, J. (1985). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Chicago: Nelson-Hall.
- Tajfel, H., & Wilkes, A. L. (1964). Saliency of attributes and commitment to extreme judgments in the perception of people. *British Journal of Social and Clinical Psychology*, 2, 40–49.
- Taylor, S. E., & Fiske, S. T. (1978). Saliency, attention, and attribution: Top of the head phenomena. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11, pp. 249–288). San Diego, CA: Academic Press.
- Turner, J. C. (1987). *Rediscovering the social group: A self-categorization theory*. Oxford, England: Basil Blackwell.
- White, G. L., & Shapiro, D. (1987). Don't I know you? Antecedents and social consequences of perceived familiarity. *Journal of Experimental Social Psychology*, 23, 75–92.
- Whittlesea, B. W. A. (1987). Preservation of specific experiences in the representation of general knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 3–17.
- Wilder, D. A. (1978). Perceiving persons as a group: Effects on attributions of causality and beliefs. *Social Psychology*, 13, 253–258.
- Wilder, D. A. (1981). Perceiving persons as a group: Categorization and intergroup relations. In D. L. Hamilton (Ed.), *Cognitive processes in stereotyping and intergroup behavior* (pp. 213–257). Hillsdale, NJ: Erlbaum.
- Zárate, M. A. (1990). *Cultural normality and social perception*. Unpublished doctoral dissertation, Purdue University, West Lafayette, IN.
- Zárate, M. A., & Smith, E. R. (1990). Person categorization and stereotyping. *Social Cognition*, 8, 161–185.

## Appendix

## Overview of Simulation

The numerical simulation results in this article were generated by a simple program written in the Pascal language. It allows for the storage of a specified set of exemplars in memory, each characterized by a set of dimensional values and some extra attributes. The dimensional values are shown as group labels (e.g., male, in-group, or employee) or as quantitative values (e.g., intelligent = 3) in the tables. The extra attributes, such as the perceiver's attitude toward the exemplar, are shown in parentheses in the tables. Because the target exemplar is assumed to have unknown values on these attributes, they do not enter into the similarity computations, but the attributes of known exemplars may be summarized to yield a judgment concerning the target.

The program then allows the input of dimension values for a target exemplar and computes its similarity to all stored exemplars, the categorization probability and representativeness value, and the assumed values for any extra attributes. In the following,  $i$  indicates the target stimulus,  $j$  the memory exemplars, and  $m$  the dimensions.

Distance ( $i, j$ ) = sum over dimensions

$$(w_m * |x_{im} - x_{jm}|).$$

(The sum is taken only over dimensions on which both  $i$  and  $j$  have nonmissing values.)

$$\text{Similarity } (i, j) = \exp(-c * \text{distance}_{ij})$$

(The value of  $c$  is fixed at 2.0 in all these simulations.)

Identification probability ( $i, j$ ) = similarity<sub>ij</sub> / (sum of similarity of target to all memory exemplars).

Categorization probability = (sum of similarity to all Category A members) / (sum of similarity of target to all memory exemplars).

Category representativeness = (sum of similarity to all Category A members) / (sum of similarity of target to all Category A nonmembers).

Extra attribute judgment = sum over memory exemplars (similarity<sub>ij</sub> \* attribute<sub>j</sub>) / (sum of similarity of target to all memory exemplars).

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