Contrast Effects as Determined by the Type of Prime: Trait Versus Exemplar Primes Initiate Processing Strategies That Differ in How Accessible Constructs Are Used

Gordon B. Moskowitz and Ian W. Skurnik
Princeton University

In 4 experiments it was found that contrast effects in person perception depend on the type and extremity of the primed information. Two previous models of priming effects, the standard-of-comparison and the set-reset models, make opposing predictions for the consequences of prime extremity on contrast effects. In Experiments 1 and 2 it was found that each model is descriptively accurate but in response to different priming stimuli. Exemplar primes (e.g., Dracula) produced greater contrast when extreme than when moderate, a pattern consistent with the standard-of-comparison model. Trait term primes (e.g., malevolent) produced greater contrast when moderate than when extreme, which is consistent with the set-reset model. In Experiments 3 and 4 it was demonstrated that the mechanisms through which contrast is produced are distinct for the 2 types of primes. Standard-of-comparison contrast is more perceptual and is not disrupted by cognitive load; set-reset contrast is effortful and requires sufficient cognitive capacity.

In his seminal 1944 article "Social Perception and Phenomenal Causality," Heider described humans as engaged in the incessant pursuit of meaning and knowledge. He referred to this pursuit as (a) a basic human drive and (b) "a problem of social cognition" (p. 359). With the first claim Heider was simply restating a fundamental epistemological canon (for a review, see Moskowitz, Skurnik, & Galinsky, 1999); that uncertainty and doubt are aversive states that need to be eliminated. This is achieved when meaning is produced. Just as one seeks food to reduce the hunger drive, one seeks meaning to reduce doubt, even if that meaning is imposed on the observed stimulus and does not meet an absolute standard of being accurate or true or reflecting objective reality. With the second claim Heider was referring to a set of phenomena from Gestalt psychology that accounts for the manner in which meaning is captured by the cognitive system: assimilation and contrast. In social psychology at least two important lines of research have grown out of Heider’s arguments regarding how people pursue meaning.

The first, attribution theory, examines how people describe the reasons for others’ actions and understand the forces that impel others to act (from situational inducements to personality traits). A second line of research that can trace its origins through Heider (1944) is accessibility theory. The focus of accessibility theory is similarly on how people arrive at meaning, specifically examining the case of how perceptually ready information is used in forming impressions of others. The current research falls within the domain of accessibility theory. We replicate the robust finding of 2 decades of research that perceivers describe others by drawing the perceived other toward their accessible constructs (assimilation), but our focus is on the processes involved when perceivers push the target away from a perceptually ready interpretation (contrast). In the first two experiments it is demonstrated that whether assimilation or contrast is produced is, in part, dependent on the nature of the accessible construct—whether it is an exemplar or a trait and whether it is extreme or moderate. Experiments 3 and 4 show that the processes that produce contrast effects differ, so that contrast following exemplar primes is efficient and effortless, whereas contrast following trait primes requires cognitive capacity. Although experimenters conducting past research have speculated about different causes for contrast effects, in the current experiments we report evidence that links specific differences in priming effects to different types of primes, and these experiments are the first to show the differential relevance of the type of prime to the cognitive processing strategies that dictate how accessible constructs are used.

Gordon B. Moskowitz and Ian W. Skurnik, Department of Psychology, Princeton University.

Ian W. Skurnik is now at the Department of Psychology, University of Michigan.

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Correspondence concerning this article should be addressed to Gordon B. Moskowitz, Department of Psychology, Green Hall, Princeton University, Princeton, New Jersey 08544. Electronic mail may be sent to gordonmo@princeton.edu.

1 By accessibility theory we refer to a set of theories that explain the manner in which accessible information directs social judgment. This encompasses the experimental work in which priming effects were examined and includes both work focused on the process by which accessible information leads to assimilation and that research focused on when accessible information leads to contrast. This would include research from the New Look movement of the 1940s and 1950s focused on perceptual sensitization and perceptual defense in addition to the social cognition work of the 1970s, 1980s, and 1990s described in the current article.
Assimilation

Sedikides and Skowronski (1991) described a “law of cognitive structure activation” in which a perceiver leans on constructs that are perceptually ready, by virtue of their recent or frequent activation, so that the perceiver may understand the behavior of others. One manner in which people lean on activated knowledge is by using it as an interpretive frame for subsequent information. This process of interpreting new information as consistent with an activated construct is known as assimilation.

Heider (1944) described assimilation as a process whereby an actor is performing an act, and one of these two ingredients (act or actor) colors the interpretation of the other by making the two ingredients seem similar. When the knowledge one has about an actor is used to interpret the actor’s behavior (what Heider called “the influence of the origin on the effect”; p. 364), a perceptually ready construct provides the meaning that is ascribed to the behavior (and one could link research on expectancy effects, stereotype type effects, and accessibility effects to this notion). When the knowledge one has about an actor’s behavior (observed actions) is used to interpret the actor and make inferences about the actor’s personality (‘influences of effects on origins’; Heider, 1944, p. 365), the traits implied by the behavior are used as “data through which we learn to know about the origins” (Heider, 1944, p. 365; and one can trace attribution theory’s origins to this notion).

Despite Heider’s (1944) discussion of assimilation, the links to modern-day accessibility theory are usually drawn through Bruner and the “New Look” perspective. Bruner (1957; Postman, Bruner, & McGimmies, 1948) discussed a form of assimilation whereby accessible motives and values shaded the interpretation of information by making relevant categories particularly ready to be used when perceiving stimuli. In the past 20 years the focus of research has shifted from Bruner’s concern with how motives and values create perceptual readiness to the incidental manner in which impressions of a target person are assimilated to accessible trait constructs and exemplars. In accessibility research (see Higgins, 1996, for a review) incidental exposure to information (such as rude being written in a sentence) increases the accessibility of (or primes) the knowledge structures associated with that information (such as notions of rudeness and related constructs).

A typical priming study is divided into two parts: priming task and judgment task. In the priming task, people are exposed to information related to a trait so the trait is made accessible. After the priming task, an ostensibly separate judgment task occurs, where participants learn about and report impressions of a “target person.” The two key elements to seeing assimilation due to accessible constructs are (a) the behavior being judged must be relevant to the knowledge structure that is activated (e.g., Higgins & Brendl, 1995; Higgins, Rholes, & Jones, 1977), and (b) the behaviors of the target person must be ambiguous and somewhat open to interpretation (diagnostic information will be less susceptible to a prime’s influence). Assimilation occurs even if perceivers are not fully aware of (or do not report) an influence on their judgment (e.g., Bargh, 1992). Bargh and Pietromonaco (1982) found assimilation even when accessibility was produced by stimuli presented outside of awareness (by flashing words too quickly for conscious recognition at individuals).

Contrast

Heider (1944) described contrast as a case of dissimilation: a process whereby an actor performs an act, and the qualities of the actor (e.g., a person not prone to jealousy) color the interpretation of the act (e.g., mildly jealous behavior), making the act and actor seem “as much unlike each other as possible” (p. 363; i.e., the behavior is seen as extremely jealous in light of the actor’s non-jealous nature). Like assimilation, contrast is a type of accessibility effect where activated knowledge is used in interpreting a given stimulus; it simply is used to illuminate the stimulus in a manner that makes it seem opposite to the accessible information. For instance, Herr (1986) found that increasing the accessibility of the construct hostility by exposing participants to hostile primes, such as Dracula, led to subsequent impressions of a target person that were less hostile. There have been several explanations for contrast effects and for why assimilation sometimes fails to occur given the increased accessibility of a knowledge structure.

The first model that accounted for contrast effects we call the standard-of-comparison model. In this model it is proposed that primes are used as standards of comparison against which new and applicable stimuli are judged (Herr, 1986; Herr, Sherman, & Fazio, 1983). This model has its roots in social judgment theory and the concepts of latitudes of acceptance and rejection (Sherif & Holland, 1961). According to this model, people do not or cannot typically bring all relevant information out of memory when making a judgment. Instead, they rely on a subset of available knowledge and are guided partly by the immediate context. If specific examples of the judgment category are at hand, people will use these examples as standards of comparison in a feature-matching process. If an exemplar is at hand that is a moderate instance of the category in question, the exemplar will share many features with vague or ambiguous target stimuli, and hence the two will be judged to be similar, resulting in assimilation. Extreme exemplars, on the other hand, share few features with other targets. If an extreme exemplar is accessible in memory, the target being judged against this standard will seem less extreme on the quality in question, resulting in contrast.

According to a second model, the set-reset model (Martin, 1986; Martin, Seta, & Crelia, 1990), assimilation and contrast depend on whether people perceive a primed construct to be a biasing influence. In an attempt to remove a potential source of bias from their judgment, people correct the judgment by subtracting out the biasing influence. Several models have adopted this notion of correction processes operating in priming effects: for example, Lombardi, Higgins, and Bargh (1987); Moskowitz and Roman (1992); Strack and Hannover (1996); and Thompson, Roman, Moskowitz, Chaiken, and Bargh (1994). Each posits that assimilation and contrast arise from people having difficulty de-

2 Heider (1944) stated that “Shakespeare makes use of this kind of contrast when he describes Othello as a person to whom jealousy is foreign. If he had introduced Othello as a man inclined to be jealous, his acts of jealousy would have lost much of their dramatic force” (p. 364).

3 Of course, there need not be an assumption that assimilation is the default and contrast the anomaly. Assimilation has simply been the more prevalent finding in the person-perception literature, perhaps simply as a result of the nature of the paradigms being used and owing nothing to the primacy of assimilation (see Stapel & Koomen, in press).
terminating if their judgment was shaped by the behavior of the target (what seems a reasonable basis for judgment) or the primed construct (what seems a biased basis for judgment). How is it that the inability to differentiate between one’s genuine reaction to a target and what has been contributed by irrelevant forces, such as primes, can lead to assimilation and contrast effects?

Certainly, it remains possible that when adjusting judgment for a potential biasing influence one can be accurate and correctly partial out only those contributions to judgment that are uniquely provided by the irrelevant biasing source. However, if there is conceptual overlap between priming stimuli and judgmental targets, people “may not make a perfect discrimination between their reaction to the priming task and their reaction to the target” (Martin et al., 1990, p. 28). Such source discrimination tasks are difficult. One consequence of this is that one can remove the contribution of a prime from judgment, but in so doing one would also remove part of one’s genuine reaction to the target—an overcorrection. The amount of one’s general reaction removed would then depend on how much perceived influence one attributed to the prime. Another consequence of the inability to perfectly distinguish between genuine and biased sources contributing to judgment is that one can attempt to correct for a prime’s biasing influence but do so insufficiently. An insufficient correction would result in one leaving a portion of the prime’s influence intact. The amount of the prime continuing to contribute to judgment would depend on how much perceived influence there was.

Contrast is dependent on one associating the accessibility of primed information with one’s reaction to the target but then resetting judgment to correct for the prime’s influence. In attempting to exclude information related to the prime from judgment, one may extract part of the genuine reaction to the target. This is essentially a case of (a) misattributing the perceptual fluency associated with a prime to the target and (b) overcorrecting for the influence. As an illustration, a target person who acts in an ambiguously reckless manner contributes both positive and negative elements to one’s reaction (Figure 1A). If one has been primed so that notions relating to recklessness are perceptually ready, a negative construct (elements related to recklessness; see Figure 1B) is accessible and may be used in one’s reaction. When one suspects an influence on judgment from a prime, elements of the prime are believed to be contributing to one’s perception of the behavior. This is represented in Figure 1C by the words in bold print. To adjust one’s judgment for this influence, one attempts to subtract it out. The result is that one’s reaction to the target has removed not only elements from the prime but elements from one’s genuine reaction to the target, thus leaving one with fewer reckless elements in the final judgment (see Figure 1D) and a contrast effect. This is an overadjustment because one has removed elements (the words in the area of overlap in Figure 1C) that actually were contributed by the target’s behavior.

Contrast effects and overcorrection for a prime’s influence are most likely to occur when one perceives a biasing influence. This

Figure 1. Diagrammatic explanation of contrast effects through correction processes (resetting). A: Contributions to one’s impressions from the behavior of an ambiguous target person (positive elements are italicized; negative elements are in normal font). B: The negative elements activated given the presence of a prime such as reckless. C: Setting by merging one’s reaction to the target’s behavior with a negative trait prime such as reckless (the perceived overlap of prime and behavior represents a potential source of influence from the prime on the perception of the behavior; this is represented by the words in bold font). D: Final impression, adjusting for, or correcting for, the prime’s perceived influence (subtracting out the perceived influence also removes part of one’s genuine reaction to the target, yielding a contrast effect).
is promoted by a prime’s increased extremity. Extreme primes (relative to moderate primes) will be more likely to be perceived as occupying separate and distinct categories than ambiguous behaviors located along the same semantic dimension. Moderate primes will be seen as sharing relatively more features with ambiguous target behaviors. Thus, a moderately hostile prime, such as troublesome, will be perceived as a more appropriate characterization of hostile behaviors such as arguing with a store clerk than will an extremely hostile prime, such as malevolent.

The consequence is that moderate primes will be more likely to be seen as having contaminated one’s reaction to the target and less likely to be seen as irrelevant to the ambiguous behaviors of the target. The more likely the prime will be seen as having contaminated one’s reaction to the target to correct for the prime’s influence, and the more likely one will have removed part of one’s genuine reaction. Thus, the extent to which the target and prime overlap (prime extremity) will determine the amount of contrast that occurs. Both moderate and extreme primes can lead to a perceived bias in judgment, but moderate primes will more likely lead to contrast, as the strength of the perceived bias is greater.

Assimilation is dependent on one’s associating the accessibility of primed information with one’s reaction to the target and setting judgment on this biased impression; it is a merging of target and prime in a manner such that the biasing influence of the prime on the merged impression is not accounted for, and the impression is set with the prime intact. This is essentially a case of (a) misattributing the perceptual fluency associated with a prime to the target and (b) either not adjusting or underadjusting for the misattributed fluency (the prime’s influence). Again, to illustrate the point, an ambiguously reckless target (Figure 2A) has both positive and negative elements contributing to one’s reaction; priming reckless adds purely negative elements (Figure 2B). One can then either fail to adjust (resulting in all of the traits in Figure 2C being assigned to the target) or underadjust (resulting in all of the traits in Figure 2C, except the bold ones, being assigned to the target).4

The result is that one’s reaction to the target is left with contributions by the prime and greater perceived recklessness. Failure to adjust for a prime’s influence is most likely to occur when one does not perceive a biasing influence; this is promoted by one not being aware of the prime and, if one is aware of the prime, by the prime’s increased extremity (as reviewed above).

4 If any adjustment is attempted after setting, assimilation could still result because of an insufficient correction for the prime’s influence. That is, if one underestimates the influence of the prime, the initial impression would have incorporated the prime as in Figure 2C, but the subsequent attempt at correction would have adjusted for only a small piece of the prime’s influence. As shown by Figure 2C, this would essentially be equivalent to removing from one’s impression only the area of overlap between the two circles (the region with bold words). This would still leave one’s impression heavily influenced by the negative contributions of the prime.
Initial support for correction models of contrast effects came from correlational analyses. Both Lombardi et al. (1987) and Newman and Uleman (1990) included in their priming experiments measures that assessed recall for the primes. They found that recall for prime words was correlated with contrast in judgment. These findings were interpreted as suggesting that memory for the prime words indicated a heightened awareness of the primes and their presence in consciousness. It was posited that awareness of the primes led perceivers to believe that their judgments were influenced by the primes. Attempts to correct for this influence led to the contrast effects. Martin (1986) drew a similar conclusion in an experiment in which accessibility was created by blatantly presenting prime words to participants. Presenting prime words blatantly (rather than subtly) led to contrast effects and the conclusion that awareness of a potential biasing influence (the blatant primes) motivated attempts to remove the bias from judgment.

The first direct test of whether awareness of a primed trait (and thus awareness of a potential influence on judgment) led to contrast was conducted by Moskowitz and Roman (1992). They manipulated awareness of the primed traits by having participants read trait-implying sentences. Half the participants were instructed to form an impression of the people described in the sentences, thus consciously activating trait terms. Half were instructed to memorize the sentences, and traits would thus be activated only through spontaneous and implicit processes of trait inference (Uleman, Newman, & Moskowitz, 1996). Participants next read a passage about a person behaving in an ambiguous manner and judged his personality. As predicted, it was found that when the sentence task promoted traits being inferred spontaneously (the equivalent of trait constructs being activated outside of awareness), assimilation effects emerged. However, when traits were consciously inferred, participants were aware of the source of their trait inferences (and their potential biasing influence) and showed contrast effects in subsequent judgments. In a conceptual replication of Moskowitz and Roman's (1992) finding that awareness of the prime produced contrast, Strack, Schwarz, Bless, Kühler, and Wänke (1993) primed people and asked half the participants to remember the priming episode (reminding them of the primes) just prior to reading about a target. Unreminded participants showed assimilation; reminded participants showed contrast effects.

Can Trait Primes Produce Contrast Effects?

In a series of recent experiments, Stapel and colleagues (Stapel & Koomen, 1997, in press; Stapel, Koomen, & van der Pligt, 1996, 1997) stated that contrast cannot be produced through accessible trait constructs. Their claim has been that contrast can occur only when accessible knowledge is used as a standard of comparison against which a target person is evaluated, and it is exemplars, rather than traits, that serve this comparative function. They stated that the narrower, more exclusive, and more distinctive a primed category is, the more likely it is that contrast will occur. Trait labels such as hostile, daring, and rude are too abstract to be used as anything other than an interpretive frame to which the target assimilates (e.g., Stapel et al., 1996). According to this line of reasoning, contrast effects following trait primes in past research have not been caused by a correction process. Instead, trait primes caused contrast in those studies because the procedures forced participants to move beyond the abstract trait constructs experi-menters thought were being primed to generate trait-relevant exemplars that were used as standards of comparison.

As an example, Stapel et al. (1996) reinterpreted Moskowitz and Roman's (1992) findings, stating that contrast is produced because being asked to form an impression leads one to hold an exemplar in mind rather than leading one to suspect a bias is present that needs to be corrected. To support this, they replicated Moskowitz and Roman but added pictures to accompany the sentences, thus promoting exemplars being held in mind when making judgments. The results showed that participants who were asked to memorize sentences and who would therefore have traits passively primed showed assimilation when no picture was provided (replicating Moskowitz & Roman) but contrast if a picture of the target was provided. This contrast effect was explained by the theory that the picture encouraged participants to use an exemplar and thus triggered standard-of-comparison processes. This seems to be a plausible account of how contrast may be promoted where assimilation would otherwise occur. However, the fact that adding pictures led to exemplar priming, and that this produced contrast where assimilation would otherwise be found, should in no way be taken as evidence that exemplars are necessary for contrast effects. At best, Stapel et al. demonstrated that exemplars are one way to trigger contrast effects.

In fact, Stapel et al.'s (1996) findings in no way address whether a standard-of-comparison process was driving contrast effects in past research. The evidence for contrast from Moskowitz and Roman (1992) came from the condition in which people were asked to form impressions (under circumstances where they were aware of the source of the potential biasing influence). Stapel et al.'s examination of contrast under these circumstances once again used the procedures of Moskowitz and Roman but manipulated the presence of a photograph. The findings in the no-photograph condition were identical to, and thus replicated, those of Moskowitz and Roman. The addition of photographs had no influence on the effect. Given the equivalence of this finding with prior research, it seems unusual to conclude that there is now evidence for standard-of-comparison processes. The only logic for doing so would be to generalize the supposed cause for contrast effects from the other conditions in their experiment, where participants were not asked to form inferences. However, there is no reason to assume that because contrast seemed to be caused by comparison processes under those circumstances (passive priming) that it is caused by such processes in all instances where contrast is displayed. Indeed, although Moskowitz and Roman posited that correction was the mechanism driving contrast effects in their study, this claim did not mandate that correction is the only manner through which contrast is produced. Certainly, Stapel et al. (1996) provided compelling evidence that contrast is not always caused by correction, but this does not warrant the conclusion that it is never caused by correction.

Contrast Through a Variety of Processes

The standard-of-comparison mechanism described by Stapel and Koomen (in press) is one possible way contrast is produced. However, our approach differs from their approach in the assertion that there is at least one other mechanism capable of producing
contrast: correction processes. The development of the narrower model of contrast proposed by Stapel and colleagues seems logical given its growth from the social judgment literature (see Stapel & Koomen, in press). In essence, a perceptual contrast effect, in the manner described by Gestalt psychology, social judgment research, and research in perception, may truly only be produced in person perception through exemplars’ serving as standards of comparison, as outlined by Stapel and Koomen (in press). Indeed, Heider (1944) so much as explicitly stated this:

Contrast does not seem to occur as influence of act on person. The unit of origin and effect is a hierarchical unit: The origin is a superordinate part, the effect a subordinate one. Therefore, the effect can be seen with the origin as background and the latter can provide a standard according to which the meaning of the effect appears, but the reciprocal relation (origin with effect as background) is impossible. (p. 365)

According to Heider, traits, as behavior labels, cannot serve as standards of comparison by which to judge people. However, people (exemplars) can be used to ascribe meaning to behaviors because exemplars can assume the role of “ground” (in Gestalt terms) in which the context of the action is determined and its meaning derived. Contrast does not originate from traits or behaviors, because contrast is produced by a comparison process, and traits cannot play the role of a standard.

One reason we propose a model that posits additional mechanisms that produce contrast, including contrast originating from traits, is that Heider’s (1944) writings referred to a particular meaning of contrast. In the Gestalt literature from which the Stapel and Heider models are derived, contrast is a perceptual phenomenon. As Stapel et al. (1996) stated, contrast is “mediated by the automatic and unconscious use of contextually induced norms or anchors” (p. 439). This is a perceptual phenomenon, much like the Mueller-Lyer illusion, in which the perceptual system passively uses the context in which a stimulus is observed to unconsiously assign meaning to it. However, contrast effects in the person perception literature are a broader phenomenon, one defined as final judgment being pushed in the direction opposite an accessible anchor. This may occur through automatic perceptual processes, but it may also be produced through more effortful processes of correction, in which judgment is adjusted in the light of a perceived bias.

In fact, Heider (1944) stated that although traits and behaviors (effects) cannot be used as standards in perception, “something like a contrast phenomenon can arise” (p. 365) without the use of exemplars as perceptual standards of comparison, such as when behavior is evaluated in light of an environmental press. By an environmental press, Heider means that awareness of the situational constraints on an individual allows one to take those constraints into account when assigning meaning to the behavior. For example, a person crying at a funeral will not be seen as sad by disposition. Awareness of the sad context will allow perceivers to adjust their perceptions of the target to account for the influence of the context variables. Perceivers do not excel at this (hence the correspondence bias; e.g., Gilbert, 1998a, 1998b; Jones, 1979) and often engage in insufficient adjustment. However, if one is aware of a biasing influence, Heider explained, too much adjustment can produce something like perceptual contrast. This “something like contrast” is exactly what person perception researchers have labeled contrast. We simply suggest that Heider’s notion of an environmental press being noted and then used to adjust judgment can be extended to include one’s adjustment for the potential influence from an accessible construct.

Exemplars and Traits: Two Prime Types, Two Mechanisms for Producing Contrast

In the current model we propose that there are at least two ways contrast can be produced and that trait priming and exemplar priming are more than likely to each be more closely linked with one of these processes rather than the other. Exemplar primes are narrow and exclusive and, as discussed by Heider (1944), can serve as a context or ground in which behavior is viewed. For these reasons, exemplars are likely to be used as standards of comparison and to produce contrast through a perceptual process that is relatively free from capacity limitations and the allocation of mental resources. This is not to say that exemplars cannot trigger correction processes. Trait primes, however, are likely to produce contrast through correction processes. This would suggest that trait primes lead to contrast when one is in possession of sufficient cognitive resources with which to carry out the effortful process of “subtracting out” the influence of the prime from one’s judgment (a process known by many names in the literature: e.g., debiasing, exclusion, correction, dissociation, adjustment).

In the first two experiments presented below we sought to illustrate that each prime type is associated with a different mechanism of yielding contrast. This was accomplished by crossing a manipulation of type of prime (exemplar vs. trait) with a manipulation of the extremity of the prime. Why extremity? This allowed us to tease apart the different processes, because although there is much empirical territory on which the standard-of-comparison and correction models do not compete, the two models do imply that different patterns of contrast are produced as the extremity of the prime increases. According to the standard-of-comparison model, the more extreme the standard relative to the judgment target, the more distinct it will be and the more likely contrast will be produced. Herr (1986; Herr et al., 1983) found that extremity of primes correlated with contrast effects, apparently without changes

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5 J. J. Skowronski (personal communication, October 1998) has pointed out that at least one other model of contrast effects exists: "Skowronski, Carlson & Isham (1995) raised the idea that when people are conscious of a trait label at encoding, they might engage in an explicit comparison of the features of the target with the features or expectancies invoked by the label. This explicit comparison process might cause people to be especially attentive to features of the stimulus that violated the expectancy provided by the label, and that this focus on inconsistent features would produce judgments that showed contrast compared to situations where the activated category merely acted as an interpretive frame, producing assimilation. One can think of this issue in terms of conscious hypothesis testing: . . . A consciously activated label can act as a hypothesis that spurs hypothesis-testing activity and a partial search for diagnostic information."

6 Stapel and Koomen (in press) discussed the possibility that although they had originally conceived of exemplars as only operating as standards that direct perception, exemplars may also operate as an interpretive frame that can exert an influence on and determine the degree of contrast effects at a later stage of processing. Thus, the possibility that exemplars can initiate correction processes has been incorporated into their most recent writings on their model.
in perceived bias. For the present hypothesis, it is important to note
that in interpreting this finding as evidence for standard-of-
comparison processes, in these two studies Herr used only exem-
plar primes (names of famous people in Herr, 1986; animals in
Herr et al., 1983). According to the correction model, the more
extreme the prime, the less the prime–target feature overlaps, and
the less likely that one will subtract the influence of the prime.
Studies that have used traits as primes have not manipulated
extremity. Such studies, therefore, do not provide evidence that
can distinguish which process underlies contrast.

Experiment 1

If a standard-of-comparison process accounts for all contrast
effects, extreme primes should produce greater contrast than mod-
erate primes, regardless of prime type. If correction explains all
contrast effects, extreme primes should produce less contrast than
moderate primes, regardless of prime type. We propose that two
types of contrast effects are produced that are initiated by different
types of accessible constructs. Exemplars produce contrast through
a standard-of-comparison process, with degree of contrast directly
related to prime extremity. Traits produce contrast through a
correction process, with degree of contrast inversely related to
prime extremity. 7

Method

Overview and Design

Participants responded to words on a computer screen as part of a
"reaction time" study. Among these words were primes related to hostility.
Half of the participants saw prime words that were names of hostile people
(e.g., Mike Tyson); half saw primes that were traits (e.g., malicious). In
addition, half of the participants saw extremely hostile words and half saw
moderately hostile words. Following this task, and ostensibly as part of a
different study, participants read about and reported their impressions of a
target actor. The study had a 2 (prime type: exemplar or trait) \times 2 (prime
extremity: moderate or extreme) between-participants factorial design.

Participants

Forty-four Princeton University students participated as part of a course
requirement.

Materials

Prime words. A pretest was conducted in which 70 undergraduates
rated either 59 names or 55 trait terms for degree of hostility on a 0–9
scale, with higher numbers indicating greater hostility (see Herr, 1986). We
selected prime words for the two levels of the extremity manipulation
according to two criteria: greatest match of mean ratings and smallest
standard deviations (the words are presented in Table 1). Extreme primes
had a mean rating of just over 8 on the scale, and moderate primes had a
mean rating of just over 4.5.

Behaviors to be judged. A separate group of participants (n = 20) was
used to pretest prime-relevant behaviors to describe the target person
(Donald). Behaviors included four drawn from the target description used
by Snell and Wyer (1979). On the basis of our pretesting, we modified Snell
and Wyer’s paragraph. To ensure that these behaviors did not create an
overall impression of high hostility when presented together, we had a third
group of 18 participants rate the completed Donald story for hostility on a
10-point scale anchored by 0 (not at all hostile) and 9 (extremely hostile).
Participants rated Donald at the middle of the scale \( M = 4.5, SD = 1.7 \).

Table 1

<table>
<thead>
<tr>
<th>Prime word</th>
<th>Trait</th>
<th>Exemplar</th>
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<tbody>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
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<tr>
<td>Perverse</td>
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<td>1.42</td>
</tr>
<tr>
<td>M</td>
<td>8.29</td>
<td>1.65</td>
</tr>
</tbody>
</table>

Note. Scores are from a 10-point scale anchored by 0 (not at all hostile)
and 9 (extremely hostile).

Procedure

Participants were told that they would take part in a number of unrelated
studies. First among these was a study of “visual reaction times,” in which
participants indicated as quickly as possible on which side of a computer
screen a word was presented. Each trial consisted of presentation of a
fixation cross (to constrain attention), a prime or filler word, and a pattern
mask (to add credibility to the visual response cover story), and each
participant completed a total of 100 trials during this priming task. Each
experimental group saw 4 different prime words (see Table 1) and 6
different filler words (e.g., Linda Gettig, Larry Jacoby, occupation, table-
cloth). Each prime and filler word appeared 10 times, and the order of
presentation of words was randomized within blocks of 10 and was fixed
for all participants.

Each participant was seated alone in front of a Dell Optiplex GX
microcomputer with a 17-in. (43.18-cm) color monitor and a standard
101-key computer keyboard with 2 keys marked in yellow. Participants
were asked to fix their gaze on the cross, and, in response to the presen-
tation of an item to the side, they were to press the yellow key on the
 corresponding side of the keyboard as quickly as possible. The prime-word
presentation was controlled by a program written in C++ (Schmidt, 1997)
for this procedure. First, a 1/2-in. (1.27-cm) fixation cross appeared in the

7 Only one study has previously manipulated prime extremity using trait
primes (Skowronski et al., 1993, Study 2), and it did not produce contrast
effects (nor was it intended to do so), perhaps not a surprising finding given
that the primes were covertly presented (Bargh, 1992). Additionally, no
measure of participants’ awareness of the primes was included in their
study, so it is not possible to discern whether participants were conscious
of the prime words at the time the target was categorized.
center of the screen and remained there for 1.4 s. On each trial, the prime or distractor word appeared 140 ms after the fixation cross disappeared. Words were presented on the right or left side of the screen in an order that was random and fixed for each participant. Each word was presented for 1.25 s and was immediately pattern-masked by a string of letters long enough to cover each letter of the longest prime. There was a 1.4-s delay before the onset of the next trial.

After completing all 100 trials, participants were given a surprise recall task and asked to write down everything they could remember seeing on the screen. The purpose of this task was to ensure that participants were aware of the primes during encoding and judgment of the target person, which prior research (Moskowitz & Roman, 1992; Newman & Uleman, 1990; Strack et al., 1993) suggests can initiate contrast effects from trait word primes.

Following this task and ostensibly as part of another study, participants read a paragraph about a person named Donald (described above). Immediately after reading the description, participants were asked to rate Donald on a series of dimensions using an 11-point scale anchored by 0 (not at all) and 10 (extremely). Finally, participants were asked if any aspect of the visual reaction time study had any influence on the person perception task. At the end of the session, participants were debriefed, thanked, and excused.

Results

Manipulation Checks

Participants were given a surprise recall test following the priming procedure. All but 1 participant recalled at least one of the four prime words. The mean number of prime words recalled was 2.32. The number of prime words recalled was entered into a 2 (prime type) X 2 (prime extremity) analysis of variance (ANOVA). No significant main effects or interaction emerged.

Participants were also asked if the visual reaction time study had any influence on their impressions of Donald. Many participants reported that the surprise recall task made them pay more attention to the Donald paragraph, in case there was a second memory test later. Two participants reported the possibility that their judgments had changed to be more consistent with the primes. The data from these 2 people were excluded from the analysis.

Impressions of the Target Person

Our hypothesis derives from the fact that correction and standard-of-comparison models imply opposing patterns of contrast effects as prime extremity increases. Trait primes should lead to contrast by means of correction processes, where the greater the similarity between prime and target, the greater the contrast effect. Exemplar primes should lead to contrast by means of standard-of-comparison processes, where primes function as judgment anchors and less similar primes lead to greater contrast.

Participants reported impressions by rating a series of adjectives on a 0–10 scale, with 0 indicating none of the quality in question and 10 indicating extremely high amounts of the quality in question. Herr (1986) examined participants’ ratings of the target on the first dimension presented, and Moskowitz and Roman (1992) found that priming effects were stronger on the first rating in a series than on subsequent ratings. Therefore, in our study hostility was the first trait listed, and these ratings were submitted to a 2 (prime type) X 2 (prime extremity) ANOVA. This analysis yielded only a significant interaction, F(1, 38) = 7.96, p < .01. For exemplar primes, Donald was rated as less hostile when the primes were extreme (M = 2.91) than when moderate (M = 4.90). For trait primes, Donald was rated as less hostile when the primes were moderate (M = 3.50) than when extreme (M = 5.00). The t-test results revealed that Donald was rated reliably less hostile after extreme exemplar than moderate exemplar primes, t(19) = 2.21, p < .02, and reliably less hostile after moderate trait than extreme trait primes, t(19) = 1.73, p < .05.

According to the literature on accessibility effects, primes should affect judgments that are relevant to the primed construct but not judgments on irrelevant dimensions (e.g., Higgins, 1996). Thus, judgments on dimensions unrelated to hostility should not show a pattern of assimilation or contrast. Srull and Wyer (1979) and subsequent researchers who have used rating scales to assess judgment (e.g., Bargh & Pietromonaco, 1982; Devine, 1989) have examined this issue by creating a composite measure of judgment of irrelevant, but still evaluative, traits. We computed this measure by creating a subscale consisting of ratings on trait scales unrelated to hostility (boring, selfish, interesting, intelligent); positive dimensions were reverse scored and mean ratings were taken. The subscale of ratings unrelated to hostility was analyzed with a 2 (extreme exemplar) X 2 (prime type) ANOVA. Only a marginally significant interaction was found, F(1, 38) = 2.13, p > .10, and this interaction did not follow the same pattern of contrast exhibited for hostility ratings (no contrast was evident at all, as mean ratings of participants in all four conditions were greater than the scale midpoint, Ms > 5.2). The results are consistent with previous research establishing that priming effects influence judgments along the specifically primed category, not along unrelated yet evaluatively consistent dimensions (e.g., Higgins et al., 1977; Erdley & D’Agostino, 1988).

Discussion

In this experiment we sought to examine contrast effects, and to facilitate this we used blatant priming methods that would allow participants to be conscious of the primes. The results support the hypothesis that different types of primes can produce different priming effects. Exemplar primes and trait primes led to different patterns of contrast based on prime extremity. Extreme exemplar primes yielded greater contrast than moderate exemplar primes. Trait primes yielded greater contrast when moderate than when extreme. Our pattern of results cannot be accounted for by either a standard-of-comparison or a correction model alone. The standard-of-comparison model predicts that people use primes as reference points in subsequent related judgments. As primes increase in extremity relative to the judgment target, they share fewer features with the target and make the target seem less similar by comparison, resulting in an increased contrast effect. On the other hand, the correction model predicts that blatant primes may call into question the basis for target categorization, because it is difficult to discern whether the accessibility of the primed construct is the result of the priming episode or of the goodness of fit between the construct and the judgment target. Hence, people attempt to remove the influence of the primed construct from final judgments, and less construct-related information is expressed in judgments, resulting in contrast. The more extreme the prime, the fewer features it shares with the target, resulting in a smaller perceived biasing influence and a decreased contrast effect. Our
results for exemplar primes fit the standard-of-comparison model, and results for trait primes fit the correction model.

**Experiment 2**

The results of Experiment 1 are consistent with the hypothesis that different types of primes yield different patterns of priming effects. A stronger test of this hypothesis, however, would be to ensure that participants' spontaneous impressions are influenced by the primes. In Experiment 1, responses were constrained to the categories provided in the rating scales. Outside of a laboratory, impressions of others are not limited to a few categories. It is possible that if participants had been free to report whatever impressions came to mind, primes would not have had the same influence. Accordingly, we used a dependent measure in Experiment 2 in which participants were asked to write down any impressions of the target, following the method used by Martin et al. (1990).

**Method**

Overview and Design

After completing word puzzles, participants recorded impressions of a character in a story. The puzzle words were the primes and distractors in Experiment 1. Hence, the study had a 2 (prime type: exemplar or trait) × 2 (prime extremity: moderate or extreme) between-participants factorial design.

**Participants**

Sixty-one students at Princeton University completed a packet of experimental materials for pay.

**Procedure**

This study was the first in a packet of several studies, administered to groups of 20 to 30 participants at a time. Materials were randomly assigned within groups. The cover page of each packet contained instructions requesting participants to go through the pages in order and to not turn back to any previously completed page. The instructions on the first page of the packet for the present study explained that the investigators were interested in "various aspects of verbal cognition and visual perception" and asked participants whether they were right- or left-handed and whether their first language was English. Following this page were two word puzzles. Each puzzle was a grid of about 12 × 14 letters; the exact dimensions varied to accommodate the longest primes. Two prime and three filler words were in each puzzle (maintaining the same prime/filler ratio as in Experiment 1).

After completing the puzzles, participants were asked to engage in a number of tasks whose purpose was to clean working memory (e.g., Brown, 1958; Higgins, Bargh, & Lombardi, 1985; Strack et al., 1993): to count backward by 7s from 368, then to count backward by 6s from 467, and finally to circle all numbers in a 4 × 7 number grid that were evenly divisible by 7. We expected that as in previous studies these tasks would inhibit rehearsal of the prime words and make participants less likely to suspect a connection between the word puzzles and the impression formation task. Next, participants answered four questions about the word puzzles (adapted from Strack et al., 1993): "Did you find all the hidden words in each of the puzzles?" "How many words were hidden in each puzzle?" "How well do you remember which words were in the first puzzle and which were in the last puzzle?" (responses to this question were made on a 10-point scale), and "What part(s) of speech were the puzzle words?" (responses were made by checking the appropriate categories). These questions did not explicitly ask participants to recall prime words. After completing these tasks, participants read the Donald story.

After reading the Donald paragraph, participants were asked to "take a couple of minutes to write down your impressions of Donald." Instructions on the final page asked participants to write down as many of the word puzzle words as they could as part of a pilot investigation of memory processes. In addition, participants were asked to help the researchers by indicating if they thought any of the tasks had an influence on their responses to any other task ("For instance, words from the word puzzles or the counting backwards task may have influenced performance on the person perception task"), because the materials for several studies were being presented in the packet without interruption and could potentially interfere with each other. On completion of the entire packet, participants were thanked, paid $6, and excused.

**Results and Discussion**

**Manipulation Checks**

It was posited that reminding participants of the primes would lead to heightened awareness of the words, as reflected by increased recall for prime words. The effectiveness of the reminding task was checked by examining recall for prime words. The number of words (out of four) recalled was submitted to a 2 (prime type) × 2 (prime extremity) ANOVA. No reliable effects emerged; mean recall for prime words was approximately two words per participant. Only 2 participants failed to recall at least one prime. We cannot compare these findings with those of Strack et al. (1993), who used a similar reminding task, because they did not report any memory data. They simply assumed that reminding people improved memory. Participants were also asked if any of the tasks had influenced one another. Three participants mentioned a possible influence that was consistent with semantic priming effects on judgments of Donald, and their data were excluded from the analyses.

**Impressions of the Target Person**

The participants' judgment task was to write an open-ended description of their impressions of Donald. These descriptions were coded in two ways: (a) for the total number of negative attributes included in each description (following the procedure used by Martin et al., 1990), such that a lower score indicated a greater degree of contrast (less hostility following a hostile prime), and (b) by having coders, blind to condition, read the descriptions and rate the degree of hostility expressed on a 1 (extremely hostile) to 7 (not at all hostile) scale. A higher score on this measure indicated a greater degree of contrast (less hostility following a hostile prime). Intercoder reliability was 87%.

The scores from the descriptions were submitted to a 2 (prime type: exemplar or trait) × 2 (prime extremity: moderate or extreme) between-participants ANOVA. In support of the hypothesis, a significant two-way interaction emerged on the first dependent measure, $F(1, 55) = 15.40, p < .01$. This interaction showed that for exemplar primes, contrast was greater with extreme primes than with moderate primes ($M_s = 1.00$ and 2.64, respectively), $t(14) = 3.04, p < .01$, whereas for trait primes, contrast was greater with moderate primes than with extreme primes ($M_s = 1.06$ and 2.33, respectively), $t(15) = 2.49, p < .02$ (see Table 2).
The same interaction pattern was found on the second dependent measure, coder ratings of the hostility of the impression statements, $F(1, 55) = 4.89, p < .04$. This pattern of data revealed that for exemplar primes, contrast was greater with extreme primes than with moderate primes ($M_s = 3.36$ and $2.64$, respectively), $r(14) = 1.41$, $p < .05$, whereas for trait primes, contrast was greater with moderate primes than with extreme primes ($M_s = 3.38$ and $2.60$, respectively), $r(15) = 1.72$, $p < .05$.

Experiment 2 provides further evidence that contrast effects differ with different types of primes. As in Experiment 1, the degree of extremity of exemplar primes was directly related to the degree of contrast, whereas the degree of extremity of trait primes was inversely related to the amount of contrast. Moreover, this pattern was obtained on a less reactive measure of impressions (open-ended judgments), showing that primes exert effects on impressions without participants’ being prompted to report impressions for only those characteristics provided in rating scales. Consistent with Experiment 1, the type of prime (as determined by both content and extremity) affected the pattern of contrast that was reflected in participants’ judgments.

### The Role of Awareness in Contrast Effects

Past research (e.g., Lombardi et al., 1987; Moskowitz & Roman, 1992) suggested that contrast is more likely when judges are aware of primes at the time the target is judged. Strack et al. (1993) induced awareness by reminding participants of the primes before the judgment task; in our Experiment 1 we used a surprise recall test. In Experiment 2, we changed the awareness procedure so that it more closely paralleled that used by Strack et al. (1993). We expected that this change in procedure would not alter the findings and would result in a pattern of contrast effects identical to that found in Experiment 1, where contrast was dependent on prime type and extremity.

Although in the current experiments we induced awareness of primes to trigger correction processes, being conscious of the biasing influence is not posited to be necessary. Additionally, one need not be conscious of the fact that processes of correction are being engaged in for such processes to occur. The discussion thus far has perhaps implied that correction processes, because they involve attempts to adjust one’s judgment (and are facilitated by awareness of factors that might potentially bias judgment), require conscious awareness on the part of the perceiver. However, we induced awareness in our participants not because it is required to initiate correction, but because it is one way such processes can be instigated that has been clearly demonstrated in the literature (e.g., Moskowitz & Roman, 1992; Strack et al., 1993).

It should be noted that awareness of an influence need not imply that people can provide accurate verbal reports of the influence. Although experimental participants can sometimes recall priming stimuli, this recall does not affect reports of an influence due to the priming stimuli. By and large, participants do not report any influence of the primes on their judgments, even though they acknowledge that the primes might affect other people’s judgments (e.g., Martin, 1986; Martin et al., 1990; Moskowitz & Roman, 1992). Neither correction models, such as the set-reset model, nor the standard-of-comparison model requires that the influence of primes on judgment processes be fully aware and verbally reportable for contrast effects to occur (consistent with Nisbett & Wilson’s, 1977, discussion of awareness of the processes that produce judgment and an individual’s ability to accurately report on those processes).

Although the notion that an individual unconsciously adjusts judgment to correct for a potential biasing influence may seem unintuitive, there are many instances in the literature of processes that are deliberate and of a corrective nature that nonetheless occur preconsciously. For example, Trope and Liberman’s (1993) attribution model stated that trait inferences are arrived at unconsciously through a series of stages that happen without awareness. This involves one identifying behavior using traits to categorize the observed act (e.g., Uleman et al., 1996) and then adjusting those inferences to take into account prior information and contextual forces that serve as the perceptual ground against which the meaning of the behavior is judged. Chartrand and Bargh (1996) did not discuss correction processes but the related notion that cognitive control proceeds automatically through the activation of goals. Moskowitz, Wasel, Gollwitzer, and Schaal (in press) similarly showed the use of goals to preconsciously control stereotype activation—a deliberate act of which one is not conscious (see also Moskowitz, in press; Moskowitz, Salomon, & Taylor, in press).

#### Experiment 3

We have shown that trait and exemplar primes lead to different patterns of contrast effects. Additionally, manipulating prime extremity provided initial evidence to tease apart the processing mechanisms through which contrast is produced. Stapel et al. (1996) suggested that like perceptual contrast in Gestalt psychology, contrast in person perception results from exemplars being used as anchors that provide the context for perceiving and interpreting the meaning of a behavior. Stapel et al. likened the standard-of-comparison process to an automatic process (one that occurs without awareness, without one intending to initiate it, and without cognitive resources needing to be allocated for the process to be carried out). Although Stapel et al. did not examine the efficient, effortless, and unconscious nature of exemplar-based contrast, the suggestion that the process resembles an automatic one presents a clear way to test the proposed processing mecha-
nism: One can limit awareness of the biasing influence, intention to carry out the process, or cognitive resources and then observe whether the effect persists. If contrast persists despite the lack of one of these features, it suggests the process is passive and meets some of the criteria for automaticity.

Trait primes, however, were hypothesized to lead participants to engage in a correction process to remove the biasing influence of the prime. Correction processes such as these have been described in the literature as being effortful and requiring cognitive resources (e.g., Fiske & Neuberg, 1990; Gilbert, 1998b; Martin et al., 1990; Moskowitz et al., 1999; Strack & Hannover, 1996; Thompson et al., 1994). Thus, if correction processes produce contrast effects, these processes should depend on having the ability and motivation to engage in correction. Because trait priming is posited to yield contrast through an effortful process, a clear way to test the proposed processing mechanism becomes obvious: One can limit awareness of the biasing influence, intention to carry out the proposed process, or cognitive resources and then observe whether the effect persists. If it does not, it suggests the process is effortful.

In Experiment 3 we chose a method for examining the processing mechanisms driving trait-based and exemplar-based contrast effects that involves disrupting participants while they are working on the task. Martin (1986; see also Lombardi et al., 1987) suggested that interrupting participants while they are working on a priming task disrupts correction processes. Martin argued, borrowing from the Zeigarnik effect, that interrupting participants leads them to perseverate on the priming task. Perseveration on the prime words leads to the failure to attain closure on the priming task and the failure to correct judgments, because participants “find it more difficult to avoid the use of the primed concepts when these concepts have perseverated strongly beyond the priming task” (Martin, 1986, p. 495). Closure on the priming task allows people to experience the priming task as something separate from the judgment task. Thus, when prime words subsequently come to mind they are experienced as an episode external to the judgment task, one whose influence needs to be controlled for and partialed out. Lack of closure leads people to perseverate on the prime words, which consequently cannot be kept out of judgment.

Thus, if one is engaging in correction processes, interruption of the priming task should disrupt the resetting process, lessening the likelihood of a contrast effect emerging. However, exemplar priming is posited to produce contrast through a more perceptual process that does not require effortful correction. In fact, perseverating on the primes should exaggerate contrast effects only if the mechanism for yielding contrast is a standard-of-comparison process. The increased accessibility of a prime that would result from perseverating on it would serve only to strengthen the likelihood of the prime’s being used as a standard. Thus, interruption should hinder the processes that produce contrast through trait primes but should not disrupt (and could facilitate) the processes that produce contrast from exemplar primes.

Method

Overview and Design

Participants worked on a scrambled sentence task (e.g., Thompson et al., 1994) that had primes embedded in the task. Before completing the task they were interrupted and forced to move on to the next task, in which they read a story and recorded impressions of the main character. The prime words and story were the same as in Experiment 1, yielding between-participants variables of prime type (exemplar vs. trait) and extremity (moderate vs. extreme).

Participants

Participants were 48 undergraduate students at New York University who participated to fulfill part of a psychology course requirement.

Procedure

The procedure was identical to that in Experiment 2 with five exceptions. First, participants were run in groups of 1 to 4 and received credit, not pay, for participating. Second, participants were not Princeton University students, so we first had to pretest our stimuli for the new population. The main concern was that the target paragraph being used was still seen as ambiguous. A separate group of participants (n = 13) read the paragraph about the target person without having been primed. The mean response was 5.0 (the scale’s midpoint), only 0.5 point higher than at Princeton University. Thus, unprimed responses indicated that the target person’s behavior was ambiguous on the dimension of hostility. Third, we used rating scales as the dependent measure, as in Experiment 1. Fourth, the priming task consisted of taking a string of words that did not form a grammatically correct sentence and from them constructing a proper sentence. Prime words were presented with the same frequency as in Experiment 2; they simply were embedded in the scrambled sentences rather than in word puzzles. Each sentence had one prime word. Fifth, participants were interrupted before completing the prime task. Interruption was accomplished by explicitly telling participants that they would solve 15 scrambled sentences that would be presented on a screen. The first 10 scrambled sentences were presented on one slide. When participants were ready to move on to the final 5 scrambled sentences, a (staged) technical problem arose that prevented the sentences from being seen. Participants were told that the experimenter would seek to resolve the problem; in the interim they should move ahead to the next task, and they could resume work on the interrupted task once the problem had been solved.

During the so-called interim period participants worked on the tasks used to clear working memory (described earlier), the reminding task, and the paragraph about the target that participants were to read. Subsequent to reading the paragraph, participants were asked for their impressions of the target on the rating scales (described in Experiment 2).

Results and Discussion

Manipulation Checks

No participants mentioned a possible influence of any of the tasks on the others.

Impressions of the Target Person

Participants rated the target on the same adjective scales used in Experiment 1. Hostility was the first trait listed (subsequent irrelevant traits were combined to create an index on which to assess effects on semantically irrelevant trait dimensions. No evidence for contrast effects was found, and there was not a Prime Type × Extremity interaction). Hostility ratings were examined through planned contrasts to test the specific predictions regarding assimilation and contrast effects. The prediction was that participants with exemplar primes would show assimilation and contrast in the same pattern that had been exhibited in the first two experiments. Interruption should not affect standard-of-comparison processes.
However, interruption should affect correction processes that are posited to follow trait primes. Thus, trait priming should yield either substantially reduced contrast or even assimilation. Because the predictions no longer posited a crossover interaction but simply posited that one cell would display evidence for contrast effects while three other cells displayed evidence of assimilation, we decided to use contrast analyses rather than the ANOVA strategy followed in Experiments 1 and 2 to examine the hypotheses. Moderate traits should not differ from extreme traits, but extreme exemplars should yield lower ratings (less hostility) than moderate exemplars. Finally, extreme exemplars should produce lower ratings when compared with the three other cells in the design.

The analyses supported the predictions (see Table 3). Participants primed with exemplars showed greater contrast when primes were extreme (M = 4.1) versus moderate (M = 5.7), t(44) = 2.60, p < .01. For trait primes, there were no differences as a function of whether trait primes were extreme (M = 5.9) or moderate (M = 6.5), t(44) = 0.60, p = .55. As was expected, the comparison of participants exposed to extreme exemplars versus the other three prime types yielded a reliable difference, t(44) = 2.94, p < .01. Finally, although pretest participants cannot be treated as a true control group, because they did not complete the reminding task, the tasks aimed at short-term memory decay, or the prime task (where irrelevant traits could have been read in the scrambled sentence task to create an unprimed control group), it is interesting to see how participants in the current experiment responded relative to the unprimed pretest participants (M = 5.0). Extreme exemplars led people to move away from the mean of the “control” group and in the direction opposite to the construct being primed. Moderate exemplars and both extreme and moderate traits led people to move away from the mean of the control group, but they were drawn toward the construct being primed, indicating that assimilation, and not contrast, was occurring.

The findings reveal that interruption did not disrupt the contrast effects produced by extreme exemplar primes. However, interruption did disrupt the contrast effects produced by trait primes. This suggests that the lack of closure related to the failure to complete the priming task interfered with engaging in the correction processes that drive contrast effects for trait-primed participants. This provides evidence that exemplar-initiated contrast is produced through effortless and efficient processing, whereas trait-initiated contrast is produced through effortful processes.

### Table 3

<table>
<thead>
<tr>
<th>Prime type</th>
<th>Experiment 3: Under interruption</th>
<th>Experiment 4: Under cognitive load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime extremity</td>
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<td>Trait</td>
</tr>
<tr>
<td>Moderate</td>
<td>5.7</td>
<td>6.5</td>
</tr>
<tr>
<td>Extreme</td>
<td>4.1</td>
<td>5.9</td>
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</tbody>
</table>

*Note.* Scores are from an 11-point scale anchored by 0 (*not at all hostile*) and 10 (*extremely hostile*).

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**Experiment 4**

In Experiment 4 we provide further evidence that trait and exemplar primes initiate different processes when producing contrast effects. Rather than interrupting participants in the middle of the priming task, we instead placed participants under cognitive load to eliminate the required capacity for effortful processing. One feature of an automatic process is its ability to proceed without interference in the face of limits to cognitive capacity (e.g., Bargh, 1994). If a process persists when participants are cognitively busy, it suggests that the process operates passively and effortlessly. However, if being placed under cognitive load disrupts a process, it suggests that the process is effortful and restricted by one’s current cognitive capacity.

Demonstrating that exemplar-based contrast is effortless whereas trait-based contrast is effortful by means of a manipulation of cognitive load is useful not only as a replication of Experiment 3 but also because the literature is unclear as to why interruption should eliminate contrast effects. Although not touched on by Martin (1986), the continued use of prime words (assimilation) under interruption could be due to either an inability to engage in correction processes (e.g., perseverating on prime words is a form of cognitive load) or a lack of motivation to engage in correction processes (e.g., perseveration causes primes to not be experienced as an episode external to the judgment task. Thus, rather than perceiving the primes as a source of bias to be corrected for, one could see primes as a relevant component of the individual being judged that needs to be included).

The proposal that exemplar primes lead to an efficient processing strategy in yielding contrast, whereas trait primes lead to an effortful and resource-dependent processing strategy in yielding contrast, can therefore be more directly tested by placing participants under cognitive load. Load should interfere with contrast effects after trait primes, because it will disrupt one's ability to engage in correction processes (as demonstrated by Martin et al., 1990). Load should have no impact on contrast initiated by exemplar primes, because the standard-of-comparison process they initiate is not capacity-bound. Such a pattern would provide the most direct evidence to date that contrast is possible with both trait and exemplar primes but through different processing mechanisms.

**Overview and Design**

After completing word puzzles, participants recorded impressions of a character in a story. The word puzzles, primes, and story were the same as those used in Experiment 2, yielding the manipulations of prime type and extremity. Additionally, participants performed a task meant to place them in a state of cognitive busyenss. Hence, the study had a 2 (prime type: exemplar or trait) × 2 (prime extremity: moderate or extreme) between-participants factorial design.

**Participants**

Forty-four Princeton University students participated as part of a course requirement.

**Procedure**

The procedure was identical to that in Experiment 2 with four exceptions. First, the character in the story was named Paul. Second, participants...
were run in groups of 1 to 4 and received credit, not pay. Third, rating scales were used as the dependent measure, as in Experiment 1. Fourth, participants were placed under cognitive load (e.g., Martin et al., 1990; Thompson et al., 1994) prior to reading the story but after being primed and reminded of the priming words (see Experiment 2). Following completion of the puzzles, the tasks used to clear working memory, and the reminding task, participants were asked to perform a task meant to limit their cognitive resources and place them in a state of cognitive busyness (e.g., Gilbert, 1989). The task was presented as a study of memory processes in real-life contexts, and it required participants to remember "book titles" (which in reality were titles of articles written by Dan Gilbert). The instructions to participants were as follows:

Imagine that you are on your way to the library, and you meet a friend who asks you to check out certain important books as a favor. Imagine you have no way to write down the book titles—you must keep them in your head until you get to the library.

On the next page you will find the book titles given to you by your friend, which you will be asked to write down, in full, a few minutes from now. DO NOT WRITE DOWN THE TITLES or any information from the titles before you are asked to—you should keep the information in your head exclusively.

You will have only 20 seconds to look at the book titles. The best way to memorize the titles is to repeat them to yourself over and over, as if you were trying to remember an important telephone number. Following the book titles you will be given a reading comprehension task. Although you should try to do both tasks at the same time as best you can, the most important goal is to remember the book titles accurately.

After reading the book titles for 20 s, participants read the paragraph about Paul as directed by the same instructions provided in Experiment 2. The procedures for the remainder of the experiment were identical to Experiment 2 with the exceptions noted above. Finally, cognitive busyness was checked by asking participants to write down the names of the book titles.

Results and Discussion

Manipulation Checks

Participants were asked if any of the tasks had influenced one another. Two participants mentioned a possible influence, and their data were excluded from the analyses. To determine if people were rehearsing the book titles that constituted the load manipulation, we assessed recall for each word in the titles using a strict criterion (the word had to be recalled in the exact location it appeared in the original title and in the exact form). Mean recall using this criterion was 73% correct, ranging from a low of 38% to a high of 100%. There were no effects due to extremity or type of prime on the effectiveness of the load (all Fs < 0.4). Because all participants evidenced rehearsal of the titles, no individuals were excluded, and the load manipulation was considered successful.

Impressions of the Target Person

Participants rated Paul on a series of adjectives, with hostility being the first trait listed. (Subsequent irrelevant traits were combined to create an index on which to assess effects on semantically irrelevant trait dimensions. No evidence for contrast effects was found, and there was not a Prime Type \times Extremity interaction.) Hostility ratings were examined through planned contrasts to test the specific predictions regarding contrast effects. The prediction was that participants primed with exemplars should continue to show contrast with the same pattern exhibited in the first two experiments. Cognitive load should not affect the ability of participants to engage in standard-of-comparison processes. However, cognitive load should disable the ability to engage in the effortful correction processes that had been posited to be occurring following trait primes in the first three experiments. Thus, trait priming should fail to be followed by contrast in the current experiment.

Contrast analyses supported the predictions (see Table 3). Priming with exemplars led to greater contrast with extreme \((M = 3.1)\) than moderate primes \((M = 5.4)\), \(r(38) = 2.41, p = .02\). For trait primes, there was no difference in amount of contrast (and ratings did not reveal contrast) as a function of whether trait primes were extreme \((M = 5.7)\) or moderate \((M = 5.1), t < 1\). As expected, the comparison of participants exposed to extreme exemplars versus the other three prime types yielded a reliable difference, \(r(38) = 2.95, p < .01\). Finally, although pretest participants cannot be treated as a true control group (see above), one can examine the effects relative to the responses of unprimed pretest participants \((M = 4.5)\). Extreme exemplars led people to move away from the mean of the "control" group and in the direction opposite to the constructs being primed. Moderate exemplars and both extreme and moderate traits led people to move away from the mean of the control group, but they were drawn toward the primed construct, indicating that assimilation and not contrast was occurring.

The findings reveal that cognitive load did not disrupt contrast effects when participants were primed with extreme exemplars. However, no contrast was revealed when participants were primed with traits, suggesting that a minimum amount of cognitive capacity is required to produce contrast effects. This provides evidence that exemplar-initiated contrast does not require cognitive resources but is produced through effortless and efficient processing. Trait-initiated contrast, however, is effortful and not produced through perceptual processes in which standards of comparison are unconsciously used as a context providing meaning for observed behavior.

General Discussion

We suggest that there is not just one ubiquitous process by which contrast is produced. Four experiments reported evidence bearing on the nature of contrast effects posited by two models: standard of comparison (Herr, 1986; Stapel et al., 1996) and correction (Martin & Achee, 1992; Moskowitz & Roman, 1992; Schwarz & Bless, 1992). The former model proposes that primes are used as anchors against which judgments are made. Contrast is a function of the similarity of the prime and target such that targets are displaced away from dissimilar primes. Contrast should increase as primes increase in extremity relative to the target. The latter model holds that primes are perceived as biasing influences when construct accessibility is attributed to the priming episode rather than to the target stimulus. Contrast effects emerge from participants' attempts to provide context-independent judgments while avoiding the use of primed constructs, ultimately resulting in less construct-related information being included in the judgments. In this
model, contrast is also a function of prime-target similarity, but in this case more similar primes have a greater possible bias. Contrast should increase as primes decrease in extremity (become similar to the target) because of people eliminating part of their genuine reaction to the target when attempting to subtract out the bias.

Features of the Accessible Construct Matter

It is known that semantic priming effects are dependent on contextual demands; varying what features of a prime word are attended to can attenuate or eliminate semantic priming effects. Priming effects do not emerge when the priming task involves individuals paying attention to specific letters within the prime words (Friedrich, Henik, & Tzelgov, 1991) or counting the number of syllables in the prime words (Parkin, 1979). Such results demonstrate that priming effects are clearly affected by attention to different features of the priming stimuli. These findings also raise the possibility that it is not merely the features of prime words that influence priming effects; different types of prime words (that activate the same construct) may also produce different judgmental outcomes.

Our hypothesis was that the processes promoting contrast effects are dependent on features of the prime and the priming context. Specifically, exemplar primes (e.g., names of hostile people) can provide clear referents for judgments (of hostility). The more extreme the exemplar, the greater the dissimilarity between referent and target, and the greater the contrast. In essence, perceivers play out a process whereby they think “relative to Hitler, this person isn’t hostile.” The more Hitleresque the exemplar, the greater the contrast. However, trait primes and category labels may lead people to question the basis of their categorization of the target and may produce effects consistent with the correction model. In essence, perceivers play out a process whereby they think “Those previous words characterize this person; I better be careful not to let them influence me.” The further the prime words come from resembling the target’s vaguely hostile behaviors (the more extreme the primes), the less likely that (a) an influence will be deemed possible, and (b) contrast will emerge.

Although the data do not provide direct evidence of the processing mechanism being used, they do suggest that different processes are instigated by different prime types, with one process being relatively effortless and the other requiring minimum amounts of cognitive resources. The results suggest that a comprehensive model of priming processes must be more complex than either the correction or the standard-of-comparison model alone. Person perception studies have primed participants through the use of a variety of methodologies and prime types, including presenting trait words in a Stroop-like task (e.g., Higgins et al., 1995); allowing participants to infer trait primes, rather than explicitly presenting the primes, by having participants read trait-implying sentences (Moskowitz & Roman, 1992); or descriptions of trait-diagnostic behaviors (Sluijter & Wier, 1979); presenting exemplars of trait-relevant categories embedded in word-search puzzles (Herr, 1986); and presenting self-referential statements in a “social empathy” matching task (Martin, 1986). The current research suggests that contextual factors, such as the manner in which a construct is primed, affects the processes through which judgments are produced. This occurs independent of the semantic content of the activated construct. The nature of contrast effects is dependent on not merely what is activated but how it is activated—even on relatively small variations in the information conveyed by a prime.

With this in mind, we stress that the current research used only exemplar and trait words and represented only three methods of priming. Our data do not rule out the possibility that contrast can be produced through some other process that might be initiated by other prime types or other methods of priming, nor do our results suggest that contrast can be found only by means of the mechanisms posited by the models from which our hypotheses were derived.

The Role of Consciousness in Contrast Effects

The fact that we used conscious primes that participants were reminded of is in no way meant to suggest that we endorse the position that full consciousness of a prime’s influence is required to produce contrast. To the contrary, neither the standard-of-comparison nor the correction model we describe in this article requires that contrast effects be produced through reportable theories. Contrast achieved through the use of a temporary anchor on a dimension of judgment (the standard-of-comparison model) is unlikely to be the product of a reportable theory. Exemplar-based contrast is suggested to operate by means of unconscious processes that simply require an accessible construct, not awareness of the accessibility. It seems reasonable to predict that any accessible exemplar, supraliminally or subliminally activated, could serve as a standard.

Additionally, even trait primes might produce contrast without people having full conscious awareness of the influence of the prime. In fact, the typical finding in the literature is that people rarely report any influence of prime words on their judgments, and they even more rarely report an influence consistent with the priming effects in their experimental condition. Outside of the semantic priming literature, research where people report influences on their judgment (e.g., Wegener & Petty, 1995) similarly shows that verbal reports often only accidentally correspond with the underlying cognitive processes that are known to produce judgment outcomes (e.g., Nisbett & Wilson, 1977). In short, correction processes can operate unhindered without being verbally reportable or fully conscious.

One manner in which correction could be unconscious is through the use of an implicit theory about the meaning of the cognitive sensations produced by accessibility (e.g., theories about the meaning of increased processing fluency; see Skurnik & Moskowitz, 1998). A second manner in which trait primes might produce contrast without a conscious theory of correction being implemented is through unconscious attributions regarding the source of accessibility. For example, it may be that degree of contrast depends not only on the type and extremity of the primes but also on the degree of accessibility of the
primes. Why should accessibility differences matter in contrast effects (or even in assimilation)? The attributional logic of the correction model can speak to this question. Specifically, if the increased accessibility of a primed construct (e.g., hostility) is attributed to the judgment target, then the target is thought to have evoked the construct and hence is thought to be more hostile. However, if the increased accessibility of a construct is attributed to the priming episode, then the target’s contribution to accessibility will not be reflected in the final judgment. These two scenarios describe assimilation and contrast effects, respectively.

Clore and colleagues have developed a similar account, based on accessibility as a cognitive sensation (e.g., Clore, 1992; Clore & Parrott, 1991; Schwarz & Clore, 1996). Following this logic, enhanced accessibility—from repeated exposure or a reminder manipulation—could simply increase the prevailing attributional effect. Similar effects are demonstrated in research on the attributional underpinnings of memory judgments. Jacoby and Whitehouse (1989, Study 2) showed participants a list of words to be studied for a later recognition test (in which participants would be distinguishing old words, from the study list, from new words). During the recognition test, each test word was preceded by a “context word,” which in some cases matched the test word. Context words were presented for one of two durations: long enough to be read aloud versus subliminally. Participants in the subliminal context word condition were more likely to mistakenly call a new test item “old” if it had been preceded by a matching context word. Participants in the long exposure condition, however, were less likely to judge a new test item to be old if it had been preceded by a matching context word. Jacoby and Whitehouse proposed that judgments of the familiarity of information in part depend on the “fluency of processing” (p. 127) of the information. Participants’ fluency of processing of test words was enhanced when the context word matched the test word. When a matching context word was presented for a long duration, it was clear that a cause of the processing fluency of the subsequent test word was the context word itself. However, research participants were not able to tell precisely how much fluency might have come from the word’s presentation as a context word versus as part of the study list. In the interest of avoiding a misleading influence, in this case fluency of processing from context word presentation, research participants avoided attributing fluency to the study list. In the other condition, in which the matching context word was presented outside of conscious awareness, the only plausible cause of the enhanced fluency was prior presentation of the word in the study list. In the terminology of judgment models such as the set-reset model, the subliminal condition findings are like assimilation effects, and the supraliminal findings are like contrast effects in person perception research. Difficulty in discriminating the source of processing fluency meant that research participants either overattributed (assimilation) or underattributed (contrast) fluency of the test word to its prior presentation in the study list.

Our point is that the processes that determine how people construct their interpretations of others are dependent not merely on what construct is activated but on the features of the prime and the manner in which the construct is activated. However, both correction and standard of comparison allow that reportable theories of bias are certainly one way contrast may be produced, perhaps even the most typical process. Still, these models do not imply (a) that correction is the only process or (b) that when correction does occur, it is carried out through perceivers consciously adjusting their judgment according to a reportable, specific theory.

Conclusion

Although early research (e.g., Postman et al., 1948) found that motives, values, and other chronic, person-based sources of accessibility shaped how people subjectively construed the social world, recent research on temporarily accessible constructs has been more focused on the processes through which people construct their subjective perception of others. Our research suggests that when contextual events produce the increased accessibility of a construct (such as through exposure to prime words or to acts that prime a construct), to understand the processes that will come into play in shaping judgment one must pay particular attention to not only the semantic construct temporarily activated but the manner in which it is activated. Such concerns may ring true for chronic sources of activation, but given that the source for such activation is typically some static aspect of the self-motivational system (vs. an external source), the impact of contextual features of the prime may be less of an issue. When constructs are activated by environmental stimuli, subtle differences in priming can alter the processes that determine how accessible constructs guide the subjective perception of the world. These subtle forces determine not only if assimilation or contrast is produced but the mechanisms through which either one is produced. From minute variations in which aspects of the prime one is focused on, to differences in the types of words used to prime a construct, the processes that produce contrast effects can change (resulting in vastly different impressions) as a function of the features of the prime.

References


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