When Less Is More: The Consequences of Affective Primacy for Subliminal Priming Effects

Diederik A. Stapel
University of Groningen

Willem Koomen
University of Amsterdam

This research investigates the consequences of the notion that one can distinguish early-evaluative (when exposure is short) and late-descriptive reactions (when exposure is long) to subliminally primed trait concepts. In three studies, it was found that the evaluative effects instigated by short exposure to primed concepts were bigger than the evaluative + descriptive effects instigated by long exposure: Less is more. Only when exposure was short, target interpretations were accompanied by evaluative inferences (Studies 1 and 3). Similarly, only when exposure was short, descriptively inapplicable trait primes affected the interpretation of an ambiguous target (Studies 2 and 3).

Keywords: *subliminal perception; assimilation; priming; applicability; affect*

Although we like to think that what we see is what is really there, our impressions of the world are typically subjective interpretations rather than correct apprehensions of it. Where we see funniness, others see sarcasm. Where others see beauty, we see postmodernist plagiarism posing as "urban art." We may believe that funniness is a property of the clown and beauty is in the object, but more often than not such impressions reside mainly in the eyes of the beholder rather than in the features of the stimulus (Bruner, 1957; Jones & Nisbett, 1971). When it concerns the study of social impression formation, an important question is thus, what besides the properties of the stimulus determines the content of the eyes of the beholder, and what determines whether we see funniness or sarcasm, beauty or plagiarism?

COGNITIVE ACCESSIBILITY

Research on the impact of priming on judgment and behavior suggests that one answer to this question is cognitive accessibility. When a stimulus can be perceived in a variety of ways, then the information that is cognitively most accessible will capture the stimulus and guide the way in which it is perceived. In other words, people have a tendency to encode the social world in terms of what occupies their mind (for reviews, see Higgins, 1996; Stapel & Koomen, 2001).

Perhaps the most prominent and well-known demonstrations of cognitive accessibility effects are so-called trait priming studies (e.g., Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). Such studies show that the encoding of behavior is guided by which trait concepts are accessible at the time of impression formation. For example, Srull and Wyer (1979) used a priming task to increase the accessibility of the concepts *hostile* versus *kind*. After this task, participants were asked to give their impression of a description of "Donald," who behaved in an ambiguously hostile manner. Donald was rated more negative following the priming of hostility and more positive following the priming of kindness.

Of interest, a number of studies have now shown that conscious awareness of the priming stimuli is not necessary for such stimuli to produce effects. To give an example, Bargh and Pietromonaco (1982) found that participants who were exposed subliminally to hostile-relevant stimuli rated Srull and Wyer's Donald as possessing more

Authors' Note: This research was supported by a "Pionier" grant from the Dutch Science Foundation (Nederlandse Organisatie voor Wetenschappelijk Onderzoek) and a research grant from the Heymans Institute of the University of Groningen. We thank David Marx for his comments on an earlier version of this article. Correspondence concerning this article should be addressed to Diederik A. Stapel, Social Psychology, University of Groningen, Grote Kruisstraat 2/1, 9712 TS Groningen, the Netherlands; e-mail: d.a.stapel@ppsw.rug.nl.

PSPB, Vol. 31 No. 9, September 2005 1286-1295
DOI: 10.1177/0146167205275616

hostility than did nonprimed participants (see also Devine, 1989; Erdley & D'Agostino, 1988; Neuberg, 1988).

SUBLIMINAL PRESENTATION, UNCONSCIOUS ACTIVATION

Although numerous studies have demonstrated that subliminal priming can produce social psychologically interesting phenomena, it is less clear whether all subliminal priming effects are created equal. In the present studies, we assess the hypothesis that they are not. We make a case for the idea that the impact of subliminally primed trait information will not always be the same. This perspective is grounded in recent (social) psychological analyses of the contents of unconscious perception (see, e.g., Greenwald, 1992; Greenwald & Banaji, 1995; Loftus & Klinger, 1992; Zajonc, 2000).

In most previous subliminal priming studies there is perfect correspondence between the stimuli that are primed and the information they activate: What you prime is what you get. That is, when subliminally exposing participants to the trait concept *honest*, subsequent effects will be determined mainly by what this concept means to participants. Thus, such participants will more easily recognize honest actions, they will more readily encode evaluatively ambiguous behaviors in terms of honesty, and they are more likely to behave honestly (see, e.g., Bargh, 1997; Devine, 1989; Erdley & D'Agostino, 1988).

In the present studies, we challenge the notion that when it concerns subliminal priming effects there should always be perfect correspondence between the information that is presented and the information that exerts its influence on subsequent judgments and behaviors. Sometimes, what is presented is different from what is activated and what exerts influence. We posit that not all subliminal priming effects are created equal because what people perceive unconsciously depends on exposure time, on how long information is flashed. Specifically, we argue that whether subliminal exposure is short or long determines what type of information (i.e., solely evaluative or also descriptive information) is cognitively activated. At very short exposures, the evaluative meaning of subliminally primed stimuli will be activated. At longer exposures, the evaluative and the descriptive meaning of these stimuli may be activated. This line of reasoning is inspired by theories and findings in cognitive psychology that posit that relatively short stimulus exposures will lead to less fine-grained analysis than relatively long stimulus exposures (see, e.g., Bargh, 1997; Greenwald, 1992; Higgins, 1996; Marcel, 1983; Merikle & Reingold, 1990; Zajonc, 1980).

THE CONSEQUENCES OF SHORT VERSUS LONG STIMULUS EXPOSURE: WHEN LESS IS MORE

One of the theories that seems to be especially relevant to the idea that subliminal stimulus exposures that are relatively short should lead to more shallow information analyses than long stimulus exposures is Zajonc's (1980) theory of affective primacy (see also Stapel, Koomen, & Ruys, 2002). Similar to most information activation theories, the theory of affective primacy posits that short stimulus exposure should lead to relatively less fine-grained, less specific, and more diffuse information analyses. Of interest, Zajonc's theory suggests that the difference between short and long stimulus exposure is likely to be one of quality rather than quantity. Specifically, the core thesis of the theory of affective primacy is that when people are exposed to a stimulus, affective reactions (i.e., evaluative classifications: positive-negative) occur prior to nonaffective reactions (i.e., descriptive classifications, such as size, gender).

A host of studies have now found support for this hypothesis (for reviews, see Stapel, 2003; Zajonc, 2000). Studies by Stapel et al. (2002) have recently shown that the fact that evaluative reactions often can occur relatively early and unconsciously does not, however, mean that descriptive reactions cannot occur unconsciously. When a picture of a happy, female face is primed subliminally, evaluative reactions (happy) are typically triggered earlier than descriptive reactions (female), but both types of reactions do not need awareness to occur. Thus, there is a variety as well as a hierarchy in unaware perception (see James, 1902/1979). Both evaluative and descriptive stimulus features can be detected without awareness, but evaluative features are often detected earlier (Stapel, 2003; but see, e.g., Hermans, De Houwer, & Eelen, 1994).

This notion that descriptive meaning is picked up later than evaluative meaning has important consequences for the impact of subliminally primed trait information. In the present studies, we will focus on those consequences of the affective primacy hypothesis (rather than on testing the veridicality of the affective primacy per se; for such tests, see Stapel, 2003; Zajonc, 2000). To be more specific, the affective primacy hypothesis suggests that when subliminally priming trait concepts (e.g., adventurous vs. reckless or confident vs. arrogant), exposure time may determine what is actually activated. At very short exposures, only the evaluative meaning should be activated (positive vs. negative), whereas at longer exposure, both the descriptive and the evaluative meaning may become available (e.g., adventurous vs. reckless or confident vs. arrogant).

In the present studies, we assess the consequences of the idea that one can distinguish early-evaluative and late-descriptive reactions to subliminally primed trait

concepts. We test the hypothesis that because of the early-evaluation, late-description logic of unconscious perception, less is more; that is, when exposure times are relatively short, the impact of subliminally primed trait concepts should be relatively big (see also Greenwald, 1992; Marcel, 1983; Merikle & Rheingold, 1990; Zajonc, 1980).

The reasoning behind this is as follows: When accessible information is merely evaluative (e.g., when the construct "positive" is activated), it lacks specificity. Therefore, evaluative information is likely to exert impact on a wider range of feelings, thoughts, and judgments than information that activates both evaluative and descriptive meaning (e.g., when the construct "honest" is activated). Description adds specificity (Stapel, 2003; Zajonc, 2000) and aboutness (Higgins, 1997) to positive-negative classifications that otherwise remain relatively global. Because of this aboutness, information that contains evaluative and descriptive elements should be less likely to "spill over onto unrelated stimuli" than information that is merely evaluative (see Murphy & Zajonc, 1993, p. 739).[1] Put differently, the impact of specific information will be more specific than the impact of nonspecific information. And, because the logic of affective primacy suggests that when exposure is short, subliminally primed trait concepts are likely to activate nonspecific (evaluative) information, whereas when exposure is long, specific (evaluative + descriptive) information should be activated, we reason that the impact of short exposures should be relatively big: Less is more.

OVERVIEW OF STUDIES

We test the implications of this line of reasoning in three studies. In these studies, the same basic (short, long) subliminal priming paradigm is used (see also Stapel et al., 2002): Participants are first primed subliminally to trait concepts (e.g., thrifty vs. stingy) and then they are asked to perform an impression formation task. In each study, we focus on a specific consequence of our less-is-more hypothesis. In Study 1, we test the hypothesis that when interpreting behavior that may be interpreted in several ways (e.g., Ralph's behavior is confident-conceited), more evaluative inferences will be made during interpretation when exposure to relevant trait primes (e.g., certain) is short (Ralph is not only confident but also likable), whereas fewer inferences will be made when exposure to these primes is long (Ralph is confident). In Study 2, we test the hypothesis that when interpreting an evaluatively ambiguous target (e.g., Chris's behavior is thrifty-stingy), trait concepts that are descriptively inapplicable (confident vs. arrogant) will show an effect when exposure to these traits is short, whereas no effect will occur when exposure is long. In Study 3, we combine the "more inferences" logic of Study 1 and the "inapplicable effects" logic of Study 2 and test the hypothesis that inapplicable trait primes will show an effect similar to applicable trait primes (interpretation and inferences) when exposure to these primes is short but no effect at all when exposure is long.

STUDY 1: SHORTER FLASHES, MORE INFERENCES

Research on cognitive accessibility effects has demonstrated that the unobtrusive activation of trait concepts is likely to guide the encoding of evaluatively ambiguous behavior. Thus, when forming an impression of Quinten, who "rarely changes his mind, even when it might be better if he does," persistent seems to be the appropriate characterization when that trait is cognitively activated, whereas stubborn seems to be a better portrayal of Quinten when that trait is relatively accessible. In the present subliminal trait priming study, we test the hypothesis that the extent to which such descriptive behavior interpretations are accompanied with evaluative inferences is dependent on prime exposure time; that is, people are more likely to make more general, evaluative target inferences—judgments of characteristics that are unrelated to the specific, denotative content of the target behavior (e.g., Quinten is likable) when descriptively relevant traits (e.g., persistent vs. stubborn) are flashed extremely quickly—such that merely evaluative rather than evaluative + descriptive features are activated. But why would primed information, that is, "merely evaluative," affect a larger range of target inferences than information that is evaluative + descriptive? We reason as follows (see also Stapel & Koomen, 2000).

When people are trying to form an impression of stimulus input that is evaluatively ambiguous, the interplay between this input and primes will affect the extent to which impressions will reflect merely disambiguation of the information given or interpretation + inference. This may be illustrated best with an example: The description that "by the way Roberta acted one could readily guess that she was well aware of her ability to do many things well" is ambiguous on the confident-conceited dimension. Whether judgments of Roberta will reflect only disambiguation of the "information given" (Roberta is self-assured) or also evaluative inferences (Roberta is likable) should depend on the extent to which cognitively accessible information shows overlap mainly with the descriptive or the evaluative aspects of the target stimulus. Thus, when descriptively specific information is cognitively accessible (e.g., confident), the likelihood is increased that Roberta's behavior will be understood mainly in descriptive terms ("Roberta is self-assured"). However, when descriptively nonspecific, evaluative

information is cognitively accessible (e.g., positive), this increases the likelihood that Roberta's behavior will be understood in evaluative as well as descriptive terms. This should increase the likelihood that target interpretations will be "supercharged" evaluatively (Peabody & Goldberg, 1989; Stapel & Koomen, 2000) such that these interpretations will more easily be accompanied with general, evaluative inferences ("Roberta is self-assured, likable, and friendly").

Method

Participants and design. Participants (n = 51) were undergraduates who participated in exchange for partial course credit. The participants were randomly assigned to the conditions of a 2 (prime exposure: long, short) × 2 (prime valence: positive, negative) factorial design.

Overview. Upon arrival, participants were shown into one of eight cubicles in the experimental room and seated in front of a computer. They were then told that they would be involved in a series of unrelated studies. First, participants performed a parafoveal vigilance task (modeled after Stapel et al., 2002) in which trait concepts were presented outside of awareness. Participants were told that very short flashes would appear on the screen at unpredictable places and times and that their task was to decide as quickly and accurately as possible whether the flash appeared on the left or right side of the screen. After having completed the vigilance task, participants were thanked for their participation and given the next task. The experimenter told participants, "A colleague of mine, from another university, would like you to complete this next questionnaire." Participants were then given a booklet titled "Impression Formation." In this questionnaire, participants were asked to give judgments of a person description that was ambiguous on one dimension: confident-conceited (see Stapel & Koomen, 2000). Next, participants received a funnel debriefing procedure in which they were probed for awareness of the priming stimuli, awareness of the influence of the priming task on later judgments, and general suspicion concerning the goal of the study (see Stapel et al., 2002). Finally, participants were thanked and debriefed.

Priming. The priming task was modeled after Stapel et al.'s (2002) parafoveal priming task. Once participants were seated in front of their computer, the experimenter explained the vigilance task. Participants were seated so that the distance between their eyes and the computer screen was 80-100 cm. This ensured that the priming stimuli were presented outside of participants' perceptual field. The experimenter then instructed participants to place their index fingers on two keys of the keyboard and to press the left key, labeled "L," if a flash appeared on the left side of the screen and the right key, labeled "R," if a flash appeared on the right side of the screen. A fixation point consisting of one X was presented continually in the center of the screen. Participants were given 10 practice trials to become familiar with the procedure and to ensure that they understood it. After answering any questions, the experimenter began the 60 experimental trials of the vigilance task, which took participants approximately 10 min to complete.

Priming stimuli were trait concepts that were printed in black, times new roman letters (12 point) printed on a white screen. The words that were flashed in the 10 practice trials and in 40 of the experimental trials were neutral words (*table*, *chair*, *tree*). In the remaining 20 experimental trials, in the positive priming conditions, the following words were each flashed five times: *confident*, *certain*, *convinced*, and *secure*. In the negative priming conditions, the following words were each flashed five times: *arrogant*, *conceited*, *bigheaded*, *vain*. The order in which these words were flashed was random. In the long conditions, words were flashed for 120 ms. In the short conditions, words were flashed for 40 ms. In all conditions, these words were immediately followed by a 120-ms mask (for details, see Stapel et al., 2002).

Impression formation. On the first page of the impression formation questionnaire, participants were instructed to read a paragraph about a character named Ralph. The paragraph was ambiguous on one dimension, the prime-related, confident-conceited dimension (see Stapel & Koomen, 2000, p. 24).

On the next page of the questionnaire, participants were asked to indicate their impressions of Ralph on bipolar 7-point description-related, likeability, and description-unrelated, rating dimensions.

The description-related rating dimension was confident-conceited. Thus, the description-related response measured characterizations on the dimension on which specific (albeit ambiguous) target information was given.

The likeability rating dimensions were positive-negative, likable-dislikable, kind-unkind, and friendly-unfriendly. Thus, likeability responses measured characterizations that were unrelated to the specific descriptive content of the stimulus description and referred to relatively general and evaluatively intensive target inferences.

The description-unrelated rating dimensions were thrifty-stingy, normal-plain, sweet-aggressive, polite-crude, and kind-dishonest. Thus, description-unrelated responses measured characterizations that were unrelated to the specific descriptive content of the stimulus

description and referred to relatively specific and evaluatively moderate target inferences.

These rating dimensions were interspersed with each other in such a way that order effects of "type of scale" were unlikely to occur (see also Stapel & Koomen, 2000, p. 24). Specifically, the order in which the rating dimensions were presented was as follows: thrifty-stingy, normal-plain, confident-conceited, sweet-aggressive, positive-negative, likable-dislikable, polite-crude, kind-unkind, friendly-unfriendly, and kind-dishonest. A rating of 1 indicated a positive evaluation and a rating of 7 indicated a negative evaluation.

To simplify data presentation, we will discuss the main analyses in terms of the (composite) rating dimensions: description-related, likeability (Cronbach's $\alpha = .78$), and description-unrelated (Cronbach's $\alpha = .73$).

Awareness and suspicion. Previous subliminal priming studies have shown that the paradigm employed here provides sufficient safeguards to prevent participants from becoming aware of the priming stimuli (see Stapel et al., 2002). However, to ensure that participants were not aware of the priming stimuli, we used an extensive funnel debriefing procedure in which participants were asked increasingly specific questions about the study (see Stapel et al., 2002). This procedure revealed that all participants reported that they had seen flashes. However, no participant could report on the general or specific contents of the primes and no participant thought the vigilance and judgment tasks were related. Thus, we can safely conclude that we were successful in presenting our priming stimuli outside of awareness and in not alerting participants to the actual relation between the vigilance and judgment tasks. This also was true for Studies 2 and 3, in which we used the same paradigm as in the present study.

Results and Discussion

We tested our predictions in an analysis of variance (ANOVA), treating scale, ratings on the three rating dimensions (description-related, likeability, description-unrelated), as a within-participants factor and prime valence (positive, negative) and prime exposure (long, short) as between-participants factors. This revealed a main effect of scale, $F(2, 46) = 7.11$, $p < .01$, $\eta^2 = .13$, and a main effect of prime valence, $F(1, 46) = 21.57$, $p < .01$, $\eta^2 = .32$. These main effects were qualified by a Scale × Prime Valence interaction, $F(2, 46) = 6.11$, $p < .01$, $\eta^2 = .12$, a Prime Exposure × Prime Valence interaction, $F(1, 46) = 3.60$, $p < .05$, $\eta^2 = .07$, and the predicted Scale × Prime Valence × Prime Exposure interaction, $F(2, 46) = 4.57$, $p < .05$, $\eta^2 = .09$ (other effects, ps > .16).

As can be seen in Table 1, these effects reflect, as expected, that on the description-related scale, in both the short and the long exposure conditions, positive trait primes led to more positive target judgments ($M = 2.07$, $SD = 0.56$) than negative trait primes ($M = 3.48$, $SD = 0.79$), $F(1, 46) = 54.44$, $p < .01$, $\eta^2 = .53$. On the likeability scales, however, priming only produced effects when exposure was short. When this was the case, positive trait primes led to more positive target judgments ($M = 1.93$, $SD = 0.52$) than negative trait primes ($M = 3.50$, $SD = 1.17$), $F(1, 46) = 17.35$, $p < .01$, $\eta^2 = .27$. When exposure was long, no likeability effect occurred ($F < 1$). On the description-unrelated scales, no effects occurred (Fs < 1).

TABLE 1: Scope of Applicable Trait Priming Effects

	Prime Exposure			
	Long		*Short*	
Prime Valence	*Positive*	*Negative*	*Positive*	*Negative*
Description-related	2.15 (0.56)	3.46 (0.82)	2.00 (0.56)	3.51 (0.80)
Likability	3.46 (0.97)	3.55 (1.04)	1.93 (0.51)	3.50 (1.17)
Description-unrelated	3.15 (0.99)	3.64 (1.12)	3.57 (1.34)	3.42 (1.08)

NOTE: Scale range is from 1 to 7. Higher scores indicate more negative ratings. The table details the *M* (*SD*) ratings of an ambiguous target (confident-conceited Ralph) as a function of prime exposure (long, short) and applicable prime valence (positive, negative).

These findings provide the first support for our hypothesis that when it concerns subliminal trait priming effects, less is sometimes more. Our participants were more likely to go "beyond the information given" and accompany target interpretations (e.g., Ralph is confident) with general, evaluative inferences (Ralph is friendly) when descriptively relevant traits were flashed extremely quickly than when the time these primes were flashed was a little longer. One important determinant of the scope of priming effects thus seems to be exposure time of the primed information.

In a series of earlier (supraliminal) studies (Stapel & Koomen, 2000), we showed that the scope of priming effects is larger when trait priming effects are driven mainly by their evaluative tone (e.g., when descriptively inapplicable but evaluatively strong traits are primed, such as wonderful vs. horrible) rather than when trait priming effects are driven mainly by their descriptive meaning (e.g., when descriptively applicable traits are primed, such as confident vs. arrogant). In other words, people are more likely to go beyond the information given after evaluative priming than after descriptive priming. When viewed in combination with the present finding that the same holds true when subliminal priming is short rather than long, the present findings provide strong support for the general logic that relatively short stimulus exposures lead to less fine-grained, less specific, and more diffuse information analyses than relatively long stimulus exposures (see, e.g., Bargh, 1997;

Greenwald, 1992; Higgins, 1996; Marcel, 1983; Merikle & Reingold, 1990; Zajonc, 1980). More particularly, the present findings are in line with Zajonc's (1980) affective primacy hypothesis. The findings suggest that when exposure to subliminally primed traits is short, the evaluative but not the descriptive meaning of primed stimuli is likely to be picked up; when exposure to subliminally primed traits is long, both the evaluative and the descriptive meaning of primed stimuli can be detected.

STUDY 2: SHORTER FLASHES, STRONGER APPLICABILITY

In the universe of accessibility effects, the general belief is that excitation level is not all that matters. For accessible knowledge to exert an impact, this knowledge needs to be applicable to disambiguation of the target stimulus (Higgins, 1996).

The seminal study in which the importance of applicability was demonstrated was conducted by Higgins et al. (1977). In this study, participants were asked to judge an ambiguous (adventurous/reckless) target description after they were subtly primed with either applicable (e.g., adventurous vs. reckless) or inapplicable (e.g., obedient vs. disrespectful) trait concepts. Priming only influenced target judgments when there was descriptive overlap between the primed traits and the target stimulus.

Subsequent studies investigating the importance of prime-stimulus overlap for the occurrence of accessibility effects replicated this effect (e.g., Banaji, Hardin, & Rothman, 1993; Erdley & D'Agostino, 1988; Sedikides, 1990). Hence, applicability is commonly defined as a descriptive match between prime and target stimuli (see Higgins, 1996; Wyer & Srull, 1989). Recently, we showed that descriptive prime-stimulus overlap is not a necessary precondition for priming effects to occur (Stapel & Koomen, 2000; see also Croizet & Fiske, 2000; Martin, 1986; Stapel & Koomen, 2001). A lack of descriptive overlap may be compensated for when primed trait concepts are relatively broad (e.g., good vs. bad) or extreme (e.g., sweet vs. aggressive) instead of both narrow and moderate (e.g., thrifty vs. stingy; see Stapel & Koomen, 2000).

In the present study, we further challenge the view that descriptively inapplicable primes cannot affect judgments of evaluatively ambiguous stimuli. We test the hypothesis that even descriptively inapplicable traits that are narrow (instead of broad) and moderate (instead of extreme) may produce priming effects; that is, when prime exposure time is relatively long and both the evaluative and the descriptive meaning of trait primes is activated, then judgments of an evaluatively ambiguous target stimulus (e.g., thrifty-stingy Chris) are unlikely to be influenced by descriptively inapplicable trait primes (e.g., confident vs. conceited). The logic of affective primacy theory suggests, however, that when prime exposure time is extremely short, mainly the evaluative features of these primes will be activated. And when this is the case, when there is no specific, descriptive information that is activated, whether there is descriptive prime-stimulus overlap is—by definition—not an issue. Then, the evaluative tone of accessible information should steer the interpretation of evaluatively ambiguous behavior (Is he just thrifty or a plain miser?) in a positive or negative direction.

Method

Participants, design, priming stimuli, and measures. Participants ($n = 60$) were undergraduates who participated in exchange for partial course credit. The participants were randomly assigned to the conditions of a 2 (prime exposure: long, short) × 2 (prime valence: positive, negative) between-participants design.

The procedure was similar to Study 1. The same priming stimuli were used but a different target stimulus (to which the primes were descriptively inapplicable) was to be judged. Specifically, participants were instructed to read a paragraph about a character named Chris. The paragraph was ambiguous on one dimension: thrifty-stingy (see Stapel & Koomen, 2000, p. 29). Participants rated their impressions of Chris on a single bipolar, thrifty-stingy rating dimension. As before, a rating of 1 indicated a positive evaluation and a rating of 7 indicated a negative evaluation.

Results and Discussion

A Prime Valence × Prime Exposure ANOVA revealed the predicted interaction, $F(1, 56) = 4.60$, $p < .05$, $\eta^2 = .08$. The two main effects did not reach significance ($ps > .15$). As can be seen in Table 2, the interaction effect reflects, as expected, that in the short exposure conditions, positive trait primes led to more positive target judgments ($M = 2.47$, $SD = .83$) than negative trait primes ($M = 3.60$, $SD = 1.30$), $F(1, 56) = 6.83$, $p < .05$, $\eta^2 = .11$, whereas in the long exposure conditions, priming had no effect ($F < 1$).

These findings provide further support for our hypothesis that when it concerns subliminal trait priming effects, less is sometimes more. Priming descriptively inapplicable traits did produce effects when these traits were flashed extremely quickly, whereas such traits did not show any effects when exposure time was a little longer. These findings thus show that descriptive prime-stimulus overlap is not necessary for priming effects to occur, as is often argued (see Bargh, 1997, p. 35; Wyer & Srull, 1989, p. 372).

Recent studies of the impact of supraliminally primed traits on judgments of evaluatively ambiguous stimuli

TABLE 2: Inapplicable Trait Priming Effects

Prime Exposure	*Long*	*Short*
Target judgment		
Prime valence		
Positive	3.27 (1.03)	2.47 (0.83)
Negative	3.07 (1.53)	3.60 (1.30)

NOTE: Scale range is from 1 to 7. Higher scores indicate more negative ratings. The table details the *M* (*SD*) ratings of an ambiguous target (thrifty/stingy Chris) as a function of prime exposure (long, short) and inapplicable prime valence (positive, negative).

have shown that descriptively applicability is not always necessary for such traits to yield effects. For example, we showed trait primes that are descriptively inapplicable but broad or extreme do produce priming effects (Stapel & Koomen, 2000). Similarly, Croizet and Fiske (2000) showed that people do use descriptively inapplicable traits when forming impressions of evaluatively ambiguous behavior when they feel extra motivated to come up with a clear evaluation, when they feel "entitled to judge." The present study extends these previous investigations by showing that even when keeping motivation constant and even when primed traits are relatively narrow or moderate (instead of extreme or broad), descriptive overlap between priming and target stimuli is not necessary to yield priming effects. As long as exposure to trait primes is sufficiently short to activate merely evaluative rather than evaluative + descriptive information, descriptive overlap or the lack thereof is not an issue. In a sense, then, the present findings seem to imply that any information, as long as it has some evaluative meaning, can affect the way an evaluatively ambiguous stimulus is encoded and judged.

STUDY 3: SHORTER FLASHES, STRONGER APPLICABILITY, MORE INFERENCES

In Study 3, we further test the hypothesis that subliminal priming of descriptively inapplicable (narrow and moderate) trait concepts can exert an effect on subsequent person impressions when prime exposure time is relatively short, whereas no effect should occur when exposure time is relatively long. Specifically, we test the hypothesis that judgments of an evaluatively ambiguous target stimulus (e.g., adventurous-reckless Eric) are unlikely to be influenced by descriptively inapplicable trait primes (e.g., confident vs. conceited) when prime exposure is relatively long, whereas effects will occur when priming is relatively short. Thus, one goal of the present study is to replicate the findings of Study 2 (using a different target stimulus). Another goal of the present study was to replicate the "shorter flashes, more inferences" logic of Study 1; that is, we also test the hypothesis that the extent to which such descriptive behavior interpretations are accompanied with evaluative inferences is dependent on prime exposure time. We predict not only that people are more likely to use inapplicable primes to interpret a target's behavior when priming is extremely rather than moderately short but also that people are more likely to accompany these interpretations with general, evaluative target inferences when priming is extremely rather than moderately short.

Method

Participants, design, priming stimuli, and measures. Participants ($n = 56$) were undergraduates who participated in exchange for partial course credit. The participants were randomly assigned to the conditions of a 2 (prime exposure: long, short) × 2 (prime valence: positive, negative) between-participants design.

The procedure was similar to Study 1. The same priming stimuli were used but a different target stimulus (to which the primes were descriptively inapplicable) was to be judged. Specifically, participants were instructed to read a paragraph about a character named Eric. The paragraph was ambiguous on one dimension, adventurous-reckless (see Stapel & Koomen, 2000, p. 24). Participants rated their impressions of Eric on the relevant description-related rating dimension (adventurous-reckless) and the same likeability (Cronbach's $\alpha = .71$) and description-unrelated (Cronbach's $\alpha = .76$) rating dimensions as used in Study 1. As before, a rating of 1 indicated a positive evaluation and a rating of 7 indicated a negative evaluation.

Results and Discussion

We tested our predictions in an ANOVA, treating scale ratings on the three rating dimensions (description-related, likeability, description-unrelated) as a within-participants factor and prime valence (positive, negative) and prime exposure (long, short) as between-participants factors. This revealed a main effect of scale, $F(2, 51) = 5.91$, $p < .01$, $\eta^2 = 10$. This main effect was qualified by a Scale × Prime Valence interaction, $F(2, 51) = 3.32$, $p < .05$, $\eta^2 = .06$, and the predicted Scale × Prime Valence × Prime Exposure interaction, $F(2, 51) = 4.22$, $p < .05$, $\eta^2 = .08$ (other effects, ps > .11).

As can be seen in Table 3 on the description-related scale, priming only produced effects when exposure was short. When this was the case, positive trait primes led to more positive target judgments ($M = 2.50$, $SD = .65$) than negative trait primes ($M = 3.64$, $SD = .75$), $F(1, 51) = 14.78$, $p < .01$, $\eta^2 = .22$. When exposure was long, no effect occurred on this scale ($F < 1$). Similarly, on the likeability scales, priming only produced effects when exposure was short. When this was the case, positive trait primes led to more positive target judgments ($M = 2.43$, $SD =$

TABLE 3: Scope of Inapplicable Trait Priming Effects

	Prime Exposure			
	Long		*Short*	
Prime Valence	*Positive*	*Negative*	*Positive*	*Negative*
Description-related	2.93 (0.62)	3.08 (1.12)	2.50 (0.65)	3.64 (0.75)
Likability	3.36 (1.09)	3.23 (1.23)	2.43 (1.02)	3.50 (1.02)
Description-unrelated	3.50 (0.94)	3.62 (1.12)	3.79 (1.31)	3.36 (0.93)

NOTE: Scale range is from 1 to 7. Higher scores indicate more negative ratings. The table details the *M* (*SD*) ratings of an ambiguous target (adventurous/reckless Eric) as a function of prime exposure (long, short) and in applicable prime valence (positive, negative).

1.02) than negative trait primes ($M = 3.50$, $SD = 1.02$), $F(1, 51) = 7.09$, $p < .01$, $\eta^2 = .12$. When exposure was long, no likeability effect occurred ($F < 1$). On the description-unrelated scales, no effects occurred (Fs < 1).

These findings provide further support for our less is more hypothesis in a way that is very similar to Studies 1 and 2. As in Study 1, the present findings indicate that participants were more likely to go beyond the information given and accompany target interpretations with general, evaluative inferences (Ralph is friendly) when trait primes were flashed extremely quickly than when the time these primes were flashed was a little longer. As in Study 2, the present findings indicate that priming descriptively inapplicable traits can produce effects when these traits were flashed extremely quickly, whereas such traits do not show any effects when exposure time was a little longer.

GENERAL DISCUSSION

Together, the present studies provide evidence for what could be called an ironic effect of subliminally primed information on judgments and feelings; ironic because these studies suggest that the impact of exposure time on subliminal priming effects is such that shorter exposures produce bigger effects. Thus, when it concerns subliminal priming effects, less is more.

The results of Studies 1 and 3 suggest that less is more because they show that target interpretations (Ralph's self-assuredness means he is confident rather than arrogant) are accompanied by evaluative inferences (Ralph is a likable character) when prime exposure is short rather than long. Similarly, the results of Studies 2 and 3 suggest that less is more because they show that subliminally primed, descriptively inapplicable trait concepts (confident vs. arrogant) are more likely to affect the interpretation of an evaluatively ambiguous stimulus (thrifty-stingy Chris) when prime exposure is short rather than long.

These findings nicely support theories and results in cognitive psychology that posit that relatively short stimulus exposures lead to less fine-grained information analyses than relatively long stimulus exposures (see, e.g., Bargh, 1997; Greenwald, 1992; Higgins, 1996; Marcel, 1983; Merikle & Reingold, 1990; Zajonc, 1980). We think our findings are understood best in terms of Zajonc's (1980, 2000) affective primacy hypothesis. Similar to other theories of priming effects, this hypothesis implies that shorter stimulus exposures are more likely to activate information that is less fine-grained, less specific, and more diffuse. More interesting and especially relevant to the present results is that the affective primacy hypothesis relates this level of information-specificity to the type of information that is activated. Specifically, the affective primacy hypothesis holds that evaluative (affective) stimulus features are picked up earlier than descriptive (cognitive) stimulus features (and that, therefore, later information is by definition more specific and distinct). Thus, when priming people with trait concepts, short exposures should mainly activate evaluative information, whereas long exposures should activate evaluative as well as descriptive information (see Murphy & Zajonc, 1993; Stapel et al., 2002). In addition, because we know from our previous studies of supraliminally priming effects that the impact of "evaluative" priming on subsequent judgments is typically bigger than the impact of "descriptive" priming, it seems logical to interpret the present effects of short versus long subliminal priming in terms of the impact of evaluative versus evaluative + descriptive information. That is, the present findings suggest that the impact of subliminally primed trait concepts on judgments is stronger when exposure to these priming stimuli is short and activates mainly evaluative features (positive vs. negative) and weaker when exposure to these priming stimuli is long and activates evaluative as well as descriptive features (e.g., thrifty vs. stingy). On a more general level, these findings are thus in accordance with results indicating that in the realm of relatively explicit (e.g., controlled) social cognition, the impact of priming stimuli is often weaker, less robust, and more easily affected by contextual factors than in the realm of implicit (e.g., automatic) processing (see, e.g., Bargh, 1997; Greenwald & Banaji, 1995).

In sum, then, the studies reported here clearly show that not all subliminal priming effects are created equal. An important determinant of whether subliminally primed information may exert an impact is exposure time. Specifically, the present studies show that regardless of whether subliminally primed trait concepts may affect subsequent person judgments is a matter of less than a fraction of a second. It all depends on how many milliseconds have ticked by.

CODA

Social psychological research has used subliminal presentation techniques to investigate the ways in which people are not aware of how they interpret stimuli or of the important influences of subliminal information on their judgments. Unawareness of the primed information ensures that its effects were unintended by the subject. Thus, subliminality research can be viewed in the context of social psychology's mission to show the hidden influences of subtle situational changes on people's feelings, thought, and actions. In other words, social psychologists have not been interested so much in subliminality per se. Rather, they have used subliminal presentation as a tool to study how people can be unaware of important influences on their judgments and behavior. In other words, subliminal presentation is a tool to make sure that people are unaware of the influence of primed stimuli rather than a tool to study unawareness itself. In fact, Bargh (1992, 1997) has argued persuasively that the main reason that subliminality per se does not matter to social psychology is the notion that often similar results are obtained with supraliminal stimulus presentation as with subliminal presentation as long as respondents are not aware of the influence of the stimulus. For example, Bargh and Pietromonaco (1982) and Devine (1989) obtained priming effects with subliminal presentation of the primes using a (impression formation) paradigm in which conscious priming studies obtained similar effects, given that participants were unaware of the possible contaminating influence of the prime on subsequent judgments (e.g., Higgins et al., 1977; Srull & Wyer, 1979; see also Bargh, 1997; Higgins, 1996).

The present research challenges this view that subliminality per se does not matter to social psychology (Bargh, 1992). Independent of whether one is aware of the influence of primed stimuli, unawareness matters because its contents may be different: merely evaluative or evaluative + descriptive. Whether supraliminal and subliminal stimulus presentations are likely to activate the same type of information and exert the same types of effects thus depends on whether subliminal presentation is short and thus activates merely evaluative information or long and thus activates both evaluative and descriptive features. Put differently, subliminality matters to social psychology because it comes in different varieties and therefore has divergent effects.

NOTE

1. In previous studies, we have argued and shown that the distinctness of accessible information is an important determinant of whether such knowledge produces assimilation or contrast effects on subsequent judgments (e.g., Stapel, Koomen, & Rhys, 2002). In these studies, we found that when priming stimuli activate distinct actor-trait links ("William is honest"), contrast is more likely than when primes activate diffuse trait information that is not linked to a specific individual ("honest"). It is important to note that in the present studies, we focus—within the domain of "diffuse" trait priming—on the impact of primes that activate mainly evaluative trait-like information versus the impact of primes that activate evaluative as well as descriptive trait-like information.

REFERENCES

Banaji, M. R., Hardin, C., & Rothman, A. J. (1993). Implicit stereotyping in person judgment. *Journal of Personality and Social Psychology, 65*, 272-281.

Bargh, J. A. (1992). Does subliminality matter to social psychology? Awareness of the stimulus versus awareness of its influence. In R. Bornstein & T. Pittman (Eds.), *Perception without awareness* (pp. 236-255). New York: Guilford.

Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer (Ed.), *Advances in social cognition* (Vol. 10, pp. 1-61). Mahwah, NJ: Lawrence Erlbaum.

Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. *Journal of Personality and Social Psychology, 43*, 437-449.

Bruner, J. S. (1957). Going beyond the information given. In H. E. Gruber, K. R. Hammond, & R. Jessor (Eds.), *Contemporary approaches to cognition* (pp. 41-69). Cambridge, MA: Harvard University Press.

Croizet, J. -C., & Fiske, S. T. (2000). Moderation of priming by goals: Feeling entitled to judge increases judged usability of evaluative primes. *Journal of Experimental Social Psychology, 36*, 155-181.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology, 56*, 5-18.

Erdley, C. A., & D'Agostino, P. R. (1988). Cognitive and affective components of automatic priming effects. *Journal of Personality and Social Psychology, 54*, 741-747.

Greenwald, A. G. (1992). New look 3: Unconscious cognition reclaimed. *American Psychologist, 47*, 766-779.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*, 4-27.

Hermans, D., De Houwer, J., & Eelen, P. (1994). The affective priming effect: Automatic activation of evaluative information in memory. *Cognition and Emotion, 8*, 515-533.

Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133-168). New York: Guilford.

Higgins, E. T. (1997). Biases in social cognition: "Aboutness" as a general principle. In G. McGarty & S. A. Haslam (Eds.), *The message of social psychology* (pp. 182-199). Cambridge, UK: Blackwell.

Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology, 13*, 141-154.

James, W. (1979). *The varieties of religious experience.* New York: McMillan. (Original work published in 1902)

Jones, E. E., & Nisbett, R. E. (1971). The actor and the observer: Divergent perspectives on the causes of behavior. In E. E. Jones, D. E. Kanouse, H. H. Kelley, R. E. Nisbett, S. Valins, & B. Weiner (Eds.), *Attribution: Perceiving the causes of behavior* (pp. 79-94). Morristown, NJ: General Learning Press.

Loftus, E. F., & Klinger, M. R. (1992). Is the unconscious smart or dumb? *American Psychologist, 47*, 761-765.

Marcel, A. J. (1983). Conscious and unconscious perception: Experiments on visual masking and word recognition. *Cognitive Psychology, 15*, 197-237.

Martin, L. L. (1986). Set/reset: Use and disuse of concepts in impression formation. *Journal of Personality and Social Psychology, 51*, 493-504.

Merikle, P. M., & Reingold, E. M. (1990). Recognition and lexical decision without detection: Unconscious perception? *Journal of*

Experimental Psychology: Human Perception and Performance, 16, 574-583.

Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of Personality and Social Psychology, 64*, 723-739.

Neuberg, S. L. (1988). Behavioral implications of information presented outside of conscious awareness: The effect of subliminal presentation of trait information on behavior in the Prisoner's Dilemma Game. *Social Cognition, 6*, 207-230.

Peabody, D., & Goldberg, L. R. (1989) Some determinants of factor structures from personality-trait descriptors. *Journal of Personality and Social Psychology, 57*(3), 552-567.

Sedikides, C. (1990). Effects of fortuitously activated constructs versus activated communication goals on person impressions. *Journal of Personality and Social Psychology, 58*, 397-408.

Srull, T. K., & Wyer, R. S. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology, 37*, 1660-1672.

Stapel, D. A. (2003). Making sense of hot cognition: Why and when description influences our feelings and judgments. In J. P Forgas, K. D. Williams, & W. von Hippel (Eds.), *Social judgments: Implicit and explicit processes* (pp. 227-250). New York: Cambridge University Press.

Stapel, D. A., & Koomen, W. (2000). How far do we go beyond the information given? The impact of knowledge activation on interpretation and inference. *Journal of Personality and Social Psychology, 78*, 19-37.

Stapel, D. A., & Koomen, W. (2001). When we wonder what it all means: Interpretation goals facilitate accessibility and stereotyping effects. *Personality and Social Psychology Bulletin, 8*, 915-929.

Stapel, D. A., Koomen, W., & Ruys, K. (2002). The effects of diffuse and distinct affect. *Journal of Personality and Social Psychology, 83*, 60-74.

Wyer, R. S., & Srull, T. K. (1989). *Memory and social cognition in its social context.* Hillsdale, NJ: Lawrence Erlbaum.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist, 35*, 151-175.

Zajonc, R. B. (2000). Feeling and thinking: Closing the debate over the independence of affect. In J. Forgas (Ed.), *Feeling and thinking: The role of affect in social cognition* (pp. 31-58). New York: Cambridge University Press.

Received June 25, 2004
Revision accepted January 1, 2005