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A Meta-Analysis of Priming Effects on Impression Formation Supporting a General Model of Informational Biases

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Priming researchers have long investigated how providing information about traits in one context can influence the impressions people form of social targets in another. The literature has demonstrated that this can have 3 different effects: Sometimes primes become incorporated in the impression of the target (assimilation), sometimes they are used as standards of comparison (anchoring), and sometimes they cause people to consciously alter their judgments (correction). In this article, we present meta-analyses of these 3 effects. The mean effect size was significant in each case, such that assimilation resulted in impressions biased toward the primes, whereas anchoring and correction resulted in impressions biased away from the primes. Additionally, moderator analyses uncovered a number of variables that influence the strength of these effects, such as applicability, processing capacity, and the type of response measure. Based on these results, we propose a general model of how irrelevant information can bias judgments, detailing when and why assimilation and contrast effects result from default and corrective processes.

What if we told you that we discovered a new procedure that could reliably control the way you think? That we knew how to induce you to form positive or negative impressions of a target person at our whim? And that all of this could be accomplished without you knowing it? Although these sound like the claims of a carnival hypnotist, social psychologists have been doing this very thing since the 1970s. Researchers investigating the effect of primes on impression formation have demonstrated that mentioning traits in one context can reliably change the way that people think about a social target in an entirely different context, often without the awareness of the perceiver.

This article provides a review of studies investigating how trait primes influence impression formation. We start by describing the theories and methods that have been most influential in this field. We then present a meta-analysis performed on this literature, discussing both the overall strength of priming effects and how these are affected by moderating variables. Following this, we provide a generalized model describing how irrelevant information can influence judgments. We base this model on the results of our analyses, as well as the theoretical work of Schwarz and Bless (1992), Wegener and Petty (1995), and Smith and DeCoster (2000). We end with a discussion of the implications of our work for future research on priming and other related topics.

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Research Investigating Priming Effects on Impressions

Perhaps the best way to begin our discussion of this field is with a description of the experimental procedures found in a typical trait-priming study. Participants are usually recruited with the understanding that they will perform several short, unrelated tasks during the experimental session. The first part of the experiment is the priming phase, when participants perform a task in which they are exposed to a set of trait-related primes. The method can take many forms, including memorization, evaluation, or sometimes the mere perception of the primes. Following the priming phase, there may or may not be a distractor phase, depending

on whether the authors wish to impose a delay between exposure to the primes and exposure to the object of impression. The nature of the distractor task can vary greatly but typically avoids exposing participants to trait-related information. Next participants enter the impression formation phase, when they read about or observe a social target. The final part of the experiment is the judgment phase, when participants are asked to provide trait ratings of a target person. The effect of priming on impressions is measured by the extent to which different conditions of priming lead participants to provide different trait ratings of the target.

Primes do not always affect impressions in exactly the same way. In fact, three distinct types of priming effects are found in the literature on impression formation. Early researchers demonstrated that primes could become incorporated in people's judgments of targets, biasing their impressions toward the primes (Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). This basic priming effect has typically been referred to as *assimilation*. Researchers later discovered two conditions under which primes will have the opposite effect on impressions. Herr, Sherman, and Fazio (1983) demonstrated that extreme primes are used as standards of comparison or scale anchors[1] when making judgments, causing the target to appear to have less of the primed trait. Additionally, Martin (1986) demonstrated that when people become aware that primes may have been assimilated in their impressions, they consciously correct their impressions to remove the bias. People commonly overcorrect, leading to impressions that are biased away from the primes. Although experimental evidence suggests that the latter two are distinct processes (Moskowitz & Skurnik, 1999), anchoring and correction effects have been jointly referred to as *contrast* because both result in impressions biased away from the primes. Wegener and Petty (1995) demonstrated that correction can sometimes lead to assimilation, but it has universally led to contrast in the trait-priming literature. This is likely because people's theories about the effect of primes (which Wegener & Petty argue guide the direction of corrections) are predominantly assimilative, making the logical direction of correction toward contrast (Stapel, Koomen, & Zeelenberg, 1998).

Theories Explaining Priming

Assimilation effects are generally believed to occur because primes increase the accessibility of relevant trait concepts. Researchers have therefore proposed several models of how primes influence accessibility. Possibly the most influential of these has been the excitation-transfer model (Higgins, Bargh, & Lombardi, 1985; Wyer & Carlston, 1979). The basic premise of this model is that using mental constructs involves "exciting" particular mental representations. For a given construct to be used in a social judgment, the excitation of the corresponding representation must be increased until it reaches a threshold value. After the construct has been used, the excitation in its representation decays over time until it returns to its baseline value. The accessibility of a construct in these models is directly determined by the excitation held by its representation. Priming effects occur because processing the prime increases the excitation of the corresponding representation. This extra excitation makes the construct easier to bring to consciousness, making it more likely to be used in judgments.

As an alternative, Srull and Wyer (1989) proposed that person memory consists of a set of "storage bins" containing mental constructs. In their model, using a mental construct requires that you locate its representation in the appropriate bin and bring it to consciousness. Whenever a construct is drawn from a bin and used, the original is left in its current location and a copy is placed on top of the "stack" of representations in the bin. Anytime individuals want to perform a social inference, they look through the stack in the appropriate bin for a matching construct, starting with those at the top of the stack. Each construct in the stack has a probability of being retrieved based on how well it fits the current situation. If the first construct is not retrieved, then the search moves to the next construct in the stack, and then the next, continuing until one is chosen for the inference. In this model, the accessibility of a construct is a function of how many times it is referenced in a bin, weighted by the placement of the references. Priming effects occur because prior exposure to a construct creates copies at the top of relevant bins, making it easier to access.

Most recently, Smith and DeCoster (1998) explained accessibility effects using a connectionist model. Their model conceives person memory as a set of "nodes" interconnected by weighted "links." Concepts are represented by patterns of activation over these nodes, similar to the way that patterns of brightness across the pixels on a computer monitor can be used to represent pictures or words. To bring a particular construct to mind, this model requires that its associated representation be instantiated across the nodes. Viewing a stimulus causes the activation of an initial set of nodes. Activation is then allowed to spread across the links to other nodes in the network. The instantiated pattern, and therefore the concept brought to mind, is determined partly by the external stimulus and partly by the weights placed on the links. Every time a pattern is instantiated on the nodes, the weights change to make it easier to reproduce in the future. In

[1]Throughout the remainder of this article, we equate the concepts "standard of comparison" and "scale anchor." Although there are theoretical distinctions between the two, they have been difficult to distinguish empirically (Eiser, 1990).

this model, the accessibility of a construct is determined by the weights on the links. Patterns that are consistent with the weights are easier to instantiate and therefore more accessible than those that are inconsistent with the weights. Priming effects occur because the changes to the network following exposure to the prime make it easier for the network to instantiate the pattern corresponding to the primed construct.

Although these theories have performed well in predicting assimilation effects, they have had little to say about anchoring or correction effects. Researchers attempting to explain anchoring effects have focused primarily on characteristics of the priming stimuli (but see also Stapel & Koomen, 2001). Schwarz and Bless (1992) proposed an *inclusion–exclusion model*, stating that the influence of a prime depends on the ease with which it can be incorporated in a target impression. A prime that can be easily included with the target becomes assimilated, resulting in an impression biased toward the prime. A prime that cannot be included may instead be used as a standard of comparison, resulting in an impression that is biased away from the prime.

Researchers attempting to explain correction effects, on the other hand, have focused primarily on the mental processing of the primes. In the *set–reset model*, Martin (1986) proposed that people invoke different processes to handle primes, depending on how they are presented. If the primes are presented in a subtle fashion, they increase the accessibility of relevant traits. When a primed perceiver is later called on to form an impression, the heightened accessibility makes these traits more likely to be used in judgments. However, if primes are presented in such a way that people are consciously aware of them at the time of judgment, perceivers may try to consciously correct for their influence. This process, termed "resetting," involves ignoring thoughts perceived to be caused by the priming stimuli in an attempt to generate an unbiased impression. Resetting often leads to contrast because people become overzealous in their effort to correct for the primes. While trying to remove the influence of the prime, people may also inadvertently remove target information that would have influenced their judgment even in the absence of the prime. This causes their impression to be based on information biased against the primed trait.

Major Methodological Variations

Although experimental manipulations that alternately lead to assimilation, anchoring, and correction have certainly had the strongest influence on priming effects, there have, of course, been other methodological variations. Most of these differences do not change the general character of the experiments, although they may influence the effect of priming on impression formation. Here we present some of the most important factors that have emerged in the literature on trait priming.

Use of supraliminal versus subliminal primes. By definition, priming effects occur when a trait is activated in one context but influences the impression of a target in a different context. In their attempts to examine these effects, researchers have developed two basic ways to dissociate the primes from the target. In the first, used originally by Higgins et al. (1977), research participants are exposed to trait primes in an initial task. Then, in an ostensibly unrelated part of the experiment, the participants are asked to provide their impression of a person or behavior. This method is known as "supraliminal priming" because participants are made consciously aware of the primes, although not of the link between the primed construct and the object of impression. The dissociation of the primes and the target relies on the fact that participants believe that the priming and impression tasks are unrelated, so researchers employing this methodology often check to see if participants explicitly link the two together.

In the second method, introduced by Bargh and Pietromonaco (1982), research participants are first exposed to trait primes below the threshold of awareness. This is typically accomplished by having participants perform a task while looking at a tachistoscope or a computer monitor. Words related to the trait are then displayed on the screen for very short periods of time—on the order of milliseconds. These primes are often masked (meaning that a sequence of nonsense characters is displayed in the same place immediately following the prime) or presented in the peripheral areas of vision to make them more difficult to explicitly recognize. Participants are then asked to form an impression of a target as in supraliminal priming. This method is known as "subliminal priming" because participants never consciously see the primes. The dissociation of the primes and the target relies on the fact that participants are unable to consciously recognize the primes, so researchers often check that their presentation of the primes is truly beneath awareness.

Type of comparison. Researchers have used two different designs to measure the strength of priming effects on impression formation. In the first design, one group of research participants receives primes related to a single trait, whereas another group receives a smaller number or no primes related to that trait. Both groups are then asked to form an impression of a target. A comparison is then made of the extent to which the two groups include the critical trait in their impression. We term this a "unipolar" design because all of the primes used in the study are related to a single trait. For example, in Bargh and Pietromonaco (1982), one group of participants was presented with 80 primes re-

lated to the trait "hostile" whereas another group was presented with words with no trait implications. The effect of priming in this case is defined as the extent to which participants in the first group were more likely to rate a target person as hostile.

In the second design, half of the participants are exposed to a set of primes related to one trait whereas the other half are exposed to an equal number of primes related to a different trait. The participants are all then asked to form an impression of a target that can be interpreted in terms of either of the traits. Most of the time, one of the traits has a positive connotation and the other has a negative connotation. In this design, the researcher measures the effect of priming by determining the extent to which the participants' interpretations are consistent with the trait with which they were primed. We refer to this as a "bipolar" design because primes used in the study are typically related to two descriptively similar but evaluatively opposite traits. Higgins et al. (1977) used such a design. In their experiment, participants were first exposed to primes related to either the trait "adventurous" or the trait "reckless." In an ostensibly unrelated task, they were then asked to form an impression of an individual who regularly performed a number of high-risk activities. In this case, the effect of priming was defined as the difference between the groups on how positively they evaluated the target. Larger differences indicate that impressions had been more affected by the primes.

Our distinction between unipolar and bipolar designs is similar to the distinction between "ambiguous" and "vague" targets made by Higgins and Brendl (1995). In their terms, a target is ambiguous when it can be interpreted in terms of multiple constructs. An often-used example is Higgins et al.'s (1977) "Donald," whose high-risk behaviors can be either seen as adventurous or reckless. This type of target is commonly used in bipolar designs. A target is vague, on the other hand, when it cannot be readily interpreted in terms of any available construct. Such targets are typically constructed such that the behaviors are moderately related to just one trait. The most common example is Srull and Wyer's (1979) "Donald," whose behaviors are moderately hostile. This type of target is commonly used in studies with unipolar designs.

Prime valence. Researchers using unipolar designs have varied the valence of the primed trait. There is reason to suspect that this might impact the strength of priming. Researchers have long known that people do not always process positive and negative information in the same way. Studies have shown that, depending on the situation, either positive or negative information can be more influential in social judgments. Skowronski and Carlston (1989) resolved these seemingly contradictory results by claiming that the effect of valence depends on the type of judgment that people are trying to make. According to their theory, negative information has a stronger effect on morality or character judgments, whereas positive information has a stronger effect on ability judgments. For example, consider a person taking a difficult math test. Someone who is not intelligent would always do poorly on such an exam. Someone who is extremely bright could do quite well, but might not under all circumstances (e.g., when having an "off" day). Good performance on the exam is therefore more diagnostic of intelligence than poor performance, because even intelligent people can occasionally be expected to perform poorly. Now consider an immoral act, like stealing your friend's wallet. A moral person would never perform such a behavior, but an immoral person might, at least under some circumstances. Performing a negative behavior is therefore more diagnostic of the morality of the actor than performing a positive behavior, because immoral people will sometimes refrain from performing negative behaviors. Following from this logic, we suspect that diagnostic primes might have stronger effects on impressions than nondiagnostic primes. We therefore predict that positive primes would have the greatest impact on judgments related to ability, whereas negative primes would have the greatest impact on judgments related to morality.

Delay between priming and impression formation. Common sense (as well as all three models of accessibility mentioned previously) tells us that priming effects should decay over time. Otherwise we would all soon be overwhelmed by a mounting of priming effects, preventing us from responding to new information. We would therefore expect that the effect of a prime is moderated by the amount of time that elapses between the priming manipulation and the presentation of the object of impression. Primary research specifically conducted to examine this effect has tended to confirm that increases in the delay between priming and impression formation decrease the likelihood that the primed trait will be used in the impression (Srull & Wyer, 1980).

Applicability of primes to the target. *Applicability* is defined as the degree of overlap between the primed construct and the object of impression (Higgins, 1996). Early priming studies discovered that primes must be at least somewhat applicable for them to affect impressions (Fazio, Powell, & Herr, 1983; Higgins et al., 1977). Once this finding was established, researchers tended to avoid inapplicable conditions because the effect of inapplicability suppressed other effects.

Relation between primed construct and judged traits. Most of the experiments in this literature measure how priming a trait affects people's tenden-

cies to use that specific trait when judging a target. However, some researchers have investigated how priming affects the use of other traits that are only related to the primed construct in terms of valence. For example, an experimenter might measure judgments of kindness after priming individuals with words related to honesty. A primed construct is said to have "descriptive" implications for a judgment if the primed and judged traits have approximately the same meaning. When the judged trait has a different semantic meaning, the primes are said to only have "evaluative" implications. Primary research has most often shown that primes with descriptive implications for the judgment produce stronger effects than primes possessing only evaluative implications (Devine, 1989; Srull & Wyer, 1980).

A Meta-Analysis of Priming Effects on Impression Formation

Issues in Meta-Analyzing the Priming Literature

Before presenting the results of our analyses, we first discuss a few aspects of our meta-analytic procedure. There are many characteristics of the priming literature that made meta-analyzing this area a challenging exercise. Here we discuss the nature of these issues and explain how we chose to deal with them.

Dependent observations in moderator analyses. Unlike most literatures subjected to a meta-analysis, research investigating the effect of primes on impression formation has taken place exclusively in an experimental setting. This means that variables moderating the effect are often manipulated within a study. A single publication could therefore easily report effects that fall into several different conditions covered by this analysis. To make full use of this information, a meta-analyst would be required to calculate multiple effect sizes from each study. However, this creates a problem in analysis because the standard procedures used in meta-analysis assume that all of the effect sizes are independent. Although effects drawn from the same study typically did not involve the same participants, it is still likely that they are at least somewhat dependent because of the similarity of the setting, procedures, and researcher expectations (Glass, McGaw, & Smith, 1981, chapter 6; Rosenthal & Rubin, 1986).

To minimize the presence of dependent observations in our data sets while still taking advantage of the variability within studies, each of our moderator analyses is based on a different set of effect sizes. For a given moderator analysis, each study contributed an effect size for each level of the moderator that was present in the study. For example, if a study reported priming effects within a 3 (delay) × 2 (applicability) design, it would contribute three effects to the data set used to analyze delay, two effects to the data set used to analyze applicability, and a single effect to the data sets used to examine other moderators. Using this method, suggested by Cooper (1989), we only include dependent observations in our analyses when they are specifically related to the moderator being analyzed. If we were to use the same sample of effects for all of our analyses, we would always need to include an effect for each cell of the study design, which would introduce considerably more dependence. Note, however, that using this method means that the number of effects and the total variability present in different analyses will be different, even though we base all our analyses on the same set of studies.

In search of… an error term.[2] We chose to base our meta-analysis on δ, the standard effect size used to examine differences between groups. δ is defined as the difference between the experimental and control groups divided by the pooled standard deviation of these two groups. This can make calculations difficult at times because in analysis of variance, variability associated with factors in the model is automatically removed from the error terms used to calculate test statistics. This means that an estimate of the pooled standard deviation for this calculation cannot be directly drawn from the error terms in an analysis of variance table. Meta-analytic procedures dictate that if additional factors are crossed with the comparison of interest, the variability associated with those factors and their interactions should be reconstituted into the error term prior to calculating the standard deviation. The basic goal is to make the effect size similar to a *t*-test between the experimental and control groups. One therefore wants the standard deviation in the calculation to reflect all of the variability observed within these groups, even if it is associated with other independent variables in the design.

This issue, however, becomes more complicated when working with an experimental literature. The purpose of reconstituting variance is to make the measure of the standard deviation better reflect the variability naturally contained within the two groups of the contrast. Additional manipulated factors, however, typically add variability not normally present, so it would be inappropriate to reconstitute their effects into the error term. In this meta-analysis, we therefore decided to reconstitute only individual difference factors, and only when they were not used to induce different types of priming effects (as in Martin, Seta, & Crelia, 1990).

[2]We thank Alice Eagly, Blair Johnson, Janet Swim, and Duane Wegener for providing their perspectives on this issue.

Separation of assimilation, anchoring, and correction effects. We decided that it was inappropriate to include all assimilation, anchoring, and correction effects in a single analysis. First, assimilation effects are typically opposite in direction to anchoring and correction effects. A homogeneity analysis on the type of effect shows that the three literatures are highly distinct, $Qb(2) = 303.1372$, $p < .0001$. A moderator that has the simple effect of increasing the strength of priming across all three types might not show an overall main effect because its influence on assimilation effects would counteract its influence on anchoring and correction effects. This compromises the interpretability of moderator analyses performed on a sample including all three types of effects. Second, there is a substantial amount of evidence indicating that these effects may be the result of different mental processes (Herr et al., 1983; Martin et al., 1990). We would therefore expect that most of our moderators would interact with the type of priming effect. Unfortunately, moderator analyses including such interactions would use many more degrees of freedom, drastically reducing the power of our tests. For these reasons, we performed separate moderator analyses for assimilation, anchoring, and correction effects (with the single exception of processing capacity, which combined elements of the assimilation and correction literatures for theoretical reasons).

The decision to label an effect as caused by assimilation, anchoring, or correction was based on the theoretical rationale provided in the article from which it was drawn. Priming researchers typically theorized that correction would take place when the priming procedure was obvious (e.g., Martin, 1986) or when participants were somehow reminded of the priming materials or procedure before rendering their judgments of the target (e.g., Strack, Schwarz, Bless, Kübler, & Wänke, 1993). Both of these features increase the likelihood that perceivers notice the potential impact of the prime on their judgments, prompting them to correct for the bias. Researchers typically hypothesized that anchoring effects would occur when priming stimuli were extreme (Herr et al., 1983) or specific (Stapel & Koomen, 1996). Both of these features make it difficult to include the primed construct in the representation of the target, leading the perceiver to use it as a standard of comparison. Assimilation effects were hypothesized to occur in the absence of the conditions necessary for anchoring or correction: when the priming procedure was subtle, when participants were not reminded of the priming procedure or materials, when the priming stimuli were moderate, and when the priming materials were broadly defined. In addition, assimilation was hypothesized to occur for participants in conditions that would normally lead to correction when their ability to correct was disrupted by capacity limitations (Martin et al., 1990).

Although it might be more desirable to establish objective coding definitions for assimilation, anchoring, and correction effects, many of the theoretical criteria just described are highly subjective. It is unclear exactly how "extreme" a prime must be for it to create anchoring rather than assimilation effects, what constitutes a sufficient load to prevent the performance of correction through awareness, how specific a prime must be to be excluded from a target, or how blatant the priming procedure must be for perceivers to notice its potential impact on their judgments. Because determining the type of priming effect requires some sort of subjective decision, we felt that basing this on the theoretical rationale of the authors instead of our own judgment was less likely to introduce confirmation biases in our results. However, it is important to note that like any meta-analysis, the validity of our findings can be no greater than the validity of the original research. If the authors generated their theoretical rationales after they already knew the results, their results could be affected by post hoc biases. In this case, our mean effect sizes would be inflated because authors would tend to generate theories consistent with the pattern of results they obtained.

Method

Sample of studies. To be included in the meta-analysis, an experiment must have first primed participants and then asked for a judgment of a social stimulus. The primes must have been related to specific traits or a stereotype with specific trait implications. The primes could also not be explicitly linked to the object of impression at the time of presentation because this represents overt labeling rather than priming. Participants could not be simultaneously primed with constructs of opposite valence (as in Higgins et al., 1985) because we would be unable to determine the influence of each individual construct on impressions. The object of the judgment had to be both social and unfamiliar.[3] The dependent variable had to reflect a trait judgment, although it may have been measured as a general evaluation.

To obtain our sample, we conducted computer-based literature searches pairing the term "impression formation" with either the term "implicit memory" or variants of the terms "priming" or "accessibility." We examined Psychological Abstracts (January 1984–June 1998), PsycLit Books (January 1987–June 1998), PsycLit Journals (January 1974–June 1998), Educational Resources Information Center (January 1966–June 1998), and Dissertation Abstracts International (1966–1998). The Social Sciences Citation Index was also searched for articles referencing Higgins et al. (1977), Srull and Wyer

[3]Studies in our analysis used behaviors, unfamiliar people, and once (Herr et al., 1983) an unfamiliar animal. The last study primed the "trait" ferocity and had participants rate the ferocity of an unknown animal.

(1979), and Bargh and Pietromonaco (1982), three seminal studies investigating the role of priming on person impressions. We additionally wrote the first author of each article included in our analysis asking for any additional published or unpublished research related to priming. These searches together generated more than 900 distinct matches, and each was examined for relevance to the defined topic. Forty-seven articles from this search met the inclusion criteria mentioned previously.

Coding moderating variables. We performed moderator analyses of variables related to the study setting; variables related to the theoretical issues that have surfaced in the field; variables related to atheoretical methodological variations; and variables related to study quality. Detailed descriptions of each variable are provided in the Moderator Analysis section. We independently coded all of the moderating variables, obtaining reliabilities for the initial codes ranging from 0.714 to 1.00 with a median of 0.914. Differences were resolved through discussion.

Calculating effect sizes. Our analyses were based on *d*, which is an unbiased estimate of the population effect size δ. δ is defined as the standardized difference between experimental and control groups. We defined the experimental and control groups such that more positive values indicated greater assimilation, whereas more negative values indicated greater contrast. Specifically, in studies with a unipolar design, the experimental group was defined as the condition with the strongest priming manipulation and the control group as the condition with the weakest. In studies with a bipolar design, we defined the groups such that impressions consistent with the primed trait generated positive effects, whereas impressions consistent with the unprimed trait generated negative effects. Effect sizes were computed with the aid of DSTAT (Johnson, 1989), a computer program designed for meta-analytic calculations.

There are often multiple ways that an effect size can be calculated from a given study. We therefore established a hierarchy of calculation methods organized by how directly the information used in the calculation related to the effect size. When multiple calculation methods were available, we always chose the method most directly related to the means and standard deviation of the effect of interest (see DeCoster, 2002, p. 29). The two authors independently computed all effect sizes to ensure calculation accuracy.

Descriptive Analyses

Distribution of effects. The first step in our analysis was to examine the distributions for outliers. Appendix A contains the main effects for assimilation. We observed two outliers, one located at $d = -0.3514$ and the other at $d = 5.6557$. The negative value came from Bargh, Lombardi, and Higgins (1988), a study designed to examine the effect of chronic accessibility on priming. In this study, the investigators selected participants that were chronically accessible either with regard to social tendencies (being outgoing or not) or consideration. They then exposed those participants with chronically accessible social tendency constructs to primes related to consideration, and those with chronically accessible consideration constructs to primes related to social tendency. Participants then formed an impression of a target that could be interpreted as either outgoing or inconsiderate. Bargh et al. found that the prime initially guided impressions but that the chronically accessible construct became more influential over time. To investigate their hypotheses, the researchers purposefully pit the chronic accessibility of one trait against the temporarily (primed) accessibility of another. Though this was perfectly appropriate to answer their research question, the study is unfit for inclusion in our meta-analysis because they confounded chronic accessibility with the priming manipulation.

The extreme positive effect actually comes from Srull and Wyer (1979), one of the seminal studies in the field. After carefully examining their report, we have reason to believe that these researchers may have performed a statistical error in their analyses. First, the standard deviations of participants' impressions that may be derived from their statistics are 0.5045 and 0.4565 (for Experiments 1 and 2, respectively). These are unusually small, considering they used an 11-point rating scale as their dependent measure. Additionally, the results reported in this study are very different from those of Srull and Wyer (1980), who used a similar methodology, design, and participant population. For example, the standard deviations of participants' impressions (again measured on an 11-point scale) that may be calculated from the statistics in this article are 3.148 and 3.3196. Additionally, the overall effect size for Srull and Wyer (1980) is 0.1382, which is much smaller than the calculated effect size for Srull and Wyer (1979). Although we loathe excluding such an important study from this analysis, we believe that there is sufficient evidence to question the validity of Srull and Wyer's (1979) findings. All analyses of assimilation were therefore calculated without the inclusion of either the effects from Bargh et al. (1988) or Srull and Wyer (1979).

The main effects for anchoring and correction can be found in Appendix B and Appendix C, respectively. We did not observe outliers in either of these distributions.

Summary characteristics. Once the final data set was established, we analyzed the distribution of all three types of effects. The summary characteristics for assimilation, anchoring, and correction effects are pre-

Table 1. *Summary Characteristics*

	Assimilation	Anchoring Contrast	Correction Contrast
Number of main effects	45	11	9
Number of research participants	4794	1169	870
Mean weighted *d*	0.3541	–0.5108	–0.6840
95% confidence interval for *d*	(0.2959, 0.4123)	(–0.6280, –0.3936)	(–0.8221, –0.5459)
Range of *d*	(–0.0354, 1.1869)	(–1.2836, –0.0598)	(–1.2704, –0.1020)
Heterogeneity *Qw*	81.0663 (p = .0006)	29.1374 (p = .0012)	33.1838 (p < .0001)
Median publication year	1991	1996	1993

sented in Table 1. The mean *d* for assimilation is 0.3541, which, according to Cohen (1992), is a small to medium effect. This indicates that research participants in assimilation conditions do appear to incorporate primes in their impressions. For ease in interpreting this effect size, consider the distributions of the impressions formed by primed and unprimed individuals on a scale where larger values reflect impressions consistent with the prime. With an effect of this size, we would expect that the mean value of the primed group would be equal to the 63rd percentile of the unprimed group (U_3, from Cohen, 1977).

The mean *d* for anchoring is –0.5108. This is a medium-sized effect, indicating that participants avoided using primed constructs in their impressions when the primes were used as standards of comparison. Consider the distributions of the impressions formed by primed and unprimed individuals (where the primed individuals are under an anchoring manipulation) on a scale where larger values reflect impressions consistent with the prime. With an effect of this size, we would expect that the mean value of the primed group would only be equal to the 31st percentile of the unprimed group (U_3, from Cohen, 1977).

The mean *d* for correction is –0.6840. This is a medium to large effect, indicating that participants avoided using primed constructs in their impressions after correction. Consider the distributions of the impressions formed by primed and unprimed individuals (where the primed individuals are under a correction manipulation) on a scale where larger values reflect impressions consistent with the prime. With an effect of this size, we would expect that the mean value of the primed group would only be equal to the 25th percentile of the unprimed group (U_3, from Cohen, 1977).

Moderator Analyses

The values of *Qw* presented in Table 1 indicate that assimilation, anchoring, and correction effects are all statistically heterogeneous. This indicates the need to explain the variability through the examination of moderating variables. For each moderator, we provide the descriptive statistics within each of its levels for assimilation, anchoring, and correction effects, as well as a test of the moderator's ability to account for variability in each sample. For categorical moderators, we calculated *Qb*, a measure of the variability between factor levels roughly analogous to the regression sum of squares in regression analysis. *Qb* follows a chi-square distribution with degrees of freedom equal to the number of levels present in the moderator minus one. For continuous moderators, we present a test of the slope parameter b_1, based on a weighted regression analysis. As mentioned previously, separate analyses were performed for assimilation, anchoring, and correction effects, but we present the results simultaneously to make discussion of each moderator's influence easier.

Year of publication. Publication year was coded as a continuous variable, so we performed a weighted regression to test for a linear effect of publication year on effect sizes. In Table 2, we report both the estimate and standard error of the slope coefficients. Publication year is not a significant moderator of assimilation or correction effects, indicating that both are approximately consistent over time. For anchoring effects, year of publication is a significant moderator, indicating that more recently published anchoring effects were of a smaller magnitude.

Participant nationality. For this moderator we generated two categories. The majority of studies were conducted in North America (specifically, the United States and Canada), so we gave these their own category. We combined the remaining studies to form our second category. The results of the moderator analyses for nationality appear in Table 3.

Nationality appears to have a significant influence on assimilation, anchoring, and correction effects. In

Table 2. *Moderator Analyses for Year of Publication*

	Assimilation	Anchoring Contrast	Correction Contrast
Regression coefficient b_1	0.003184	–0.02275	–0.03169
Standard error of b_1	0.005554	0.01137	0.01939
Test of $b_1 \neq 0$	z = 0.57 (p = .5686)	z = –2.00 (p = .0454)	z = –1.63 (p = .1023)

Table 3. *Moderator Analyses for Nationality*

	Assimilation	Anchoring Contrast	Correction Contrast
United States/Canada			
Number of effects	36	5	6
Number of participants	3750	471	523
Mean weighted *d*	0.2882	–0.2579	–0.4461
Other			
Number of effects	10	7	3
Number of participants	1043	698	347
Mean weighted *d*	0.5997	–0.6906	–1.0873
Test	*Qb*[1] = 18.9343 ($p < .0001$)	*Qb*[1] = 12.7172 ($p = .0004$)	*Qb*[1] = 19.3306 ($p < .0001$)

each case, effect sizes are larger in countries outside the United States and Canada. We had no a priori expectation that nationality would moderate priming effects; moreover, there is little reason to believe that the underlying psychological principles responsible for assimilation, anchoring, or correction effects would differ cross-culturally. We therefore suspect that these effects simply reflect idiosyncratic differences between U.S./Canadian labs and those elsewhere.

Participant sex. We created four categories to code participant sex. Some studies used only male or only female participants. Some reported the presence of both male and female participants but analyzed them together. Others made no reference to the makeup of their sample. The results of the moderator analyses for participant sex appear in Table 4. There are no significant sex differences in the magnitudes of assimilation, anchoring, or correction effects.

Participant age. Like most fields of experimental psychology, the majority of priming studies have been conducted using college-age participants. We decided to use this as a breakpoint in our coding of participant age. We therefore created three age categories: younger than college-age, college-age, and older than college-age. The results of the moderator analyses for participant age appear in Table 5.

Participant age does not moderate assimilation effects but does appear to influence anchoring and correction effects. Younger participants show both greater anchoring and correction effects than college-age participants. Although caution should be taken when interpreting these findings (because the influence on anchoring is marginal, and the first cell for correction is based on only one study), they may indicate that people become more sophisticated in dealing with primes as they age. Older participants may be more resistant to the influence of primes, explaining the effect of age on anchoring and the nonsignificant trend observed in assimilation. Older participants may also be more accurate judges of a prime's influence on impressions, so that they have a smaller tendency to overcorrect for a prime's influence.

Delay. For the analysis of delay, we approximated the number of minutes between the priming and the impression-formation tasks, including the time

Table 4. *Moderator Analyses for Participant Sex*

	Assimilation	Anchoring Contrast	Correction Contrast
Only men			
Number of effects	2		
Number of participants	130		
Mean weighted *d*	0.1776		
Only women			
Number of effects	3	1	2
Number of participants	138	100	38
Mean weighted *d*	0.3488	–0.4461	–0.8208
Both			
Number of effects	31	9	8
Number of participants	3181	986	716
Mean weighted *d*	0.3777	–0.5225	–0.6771
Unreported			
Number of effects	11	1	1
Number of participants	1345	83	116
Mean weighted *d*	0.3113	–0.4531	–0.6622
Test	*Qb*[3] = 2.0356 ($p = .5651$)	*Qb*[2] = 0.2013 ($p = .9043$)	*Qb*[2] = 0.1814 ($p = .9133$)

Table 5. *Moderator Analyses for Participant Age*

	Assimilation	Anchoring Contrast	Correction Contrast
Younger than college age			
Number of effects	7	6	1
Number of participants	528	539	129
Mean weighted *d*	0.4710	–0.6345	–1.5041
College age			
Number of effects	38	8	9
Number of participants	3866	630	741
Mean weighted *d*	0.3521	–0.4041	–0.5613
Older than college age			
Number of effects	4		
Number of participants	319		
Mean weighted *d*	0.2534		
Test	$Qb[2] = 2.5264$ ($p = .2828$)	$Qb[1] = 3.6782$ ($p = .0551$)	$Qb[1] = 19.5568$ ($p < .0001$)

spent on the instructions for the impression task. We then applied a logarithmic transformation to these values, because the effect of time on mental functions typically follows an exponential curve (Newell & Rosenbloom, 1981). The results of the weighted regression analyses predicting effect size from the logarithm of the delay appear in Table 6.

Assimilation studies with longer delays produced marginally smaller effects than studies with shorter delays. Delay did not significantly moderate the strength of either anchoring or correction effects. Although the marginally significant result for assimilation is consistent with theories of accessibility, the relatively weak influence of delay overall is somewhat surprising. This result may have been caused by a restriction of range. Only one assimilation study (Srull & Wyer, 1980) and no studies of anchoring or correction examined priming effects after a delay greater than 10 min.

Table 6. *Moderator Analyses for Delay*

	Assimilation	Anchoring Contrast	Correction Contrast
Regression coefficient b_1	–0.03805	0.03618	–0.05949
Standard error of b_1	0.02146	0.0808	0.09726
Test of $b_1 \neq 0$	$z = –1.77$ ($p = .0768$)	$z = 0.4478$ ($p = .6528$)	$z = –0.6117$ ($p = .5418$)

Applicability. Applicability refers to the relation between the primes and the object of impression (Higgins et al., 1977). If the features of the primes overlapped with the features of the target person, the effect was coded as applicable. If the features of the primes did not overlap with the target in any way, the effect was coded as inapplicable. The results of the moderator analyses for applicability appear in Table 7.

Applicability moderates the strength of assimilation effects. Primes have a greater influence when applicable to a target than when they are inapplicable. No studies examining anchoring or correction used primes that were inapplicable to the object of impression, so we were unable to determine the impact of applicability on these effects.

Relation between primed and judged traits. If participants' impressions were measured along the same trait dimension that was originally primed, the primes were coded as having descriptive implications for the judgment. Otherwise the primes were coded as having evaluative implications for the judgment. The results of the moderator analyses for trait relation appear in Table 8.

Table 7. *Moderator Analyses for Applicability*

	Assimilation	Anchoring Contrast	Correction Contrast
Applicable			
Number of effects	46	11	9
Number of participants	4465	1169	870
Mean weighted *d*	0.3791	–0.5108	–0.6840
Inapplicable			
Number of effects	5		
Number of participants	329		
Mean weighted *d*	–0.0196		
Test	$Qb[1] = 12.0904$ ($p = .0005$)	NA	NA

The relation between primed and judged traits appears to be a significant moderator of assimilation and anchoring effects, but does not moderate correction effects. For assimilation, stronger effects were found when the primed construct had descriptive implications for the judgment than when it only had evaluative implications. It is important to note, however, that the assimilation effect on evaluative dimensions was not trivial ($z = 4.87$, $p < .05$). This suggests that when the prime is incorporated in the judgment, it not only affects impressions related to the primed trait but also "spills over" and influences the representation more generally. For anchoring, stronger effects were found when the primed construct had descriptive implications for the judgment than when it only had evaluative implications. Anchoring primes that only had evaluative implications for the judgment had no apparent impact on impressions ($z = –0.4337$, $p > .60$). For correction effects, there was no difference between the effects of primes with descriptive and evaluative implications.

This pattern of results is consistent with Schwarz and Bless's (1992) theorizing about the role of "salient dimensions" in comparison-based contrast effects. They argued that

> the mere accessibility of an extreme stimulus is unlikely to elicit comparison or anchoring processes, unless the stimulus brings the relevant dimension of judgment to mind. … If the stimulus is thought about with regard to some other dimension, it is unlikely to be used as a standard or scale anchor. (p. 227)

To the extent that an extreme prime such as "Hitler" brings to mind the relevant dimension of hostility, it should serve as a standard of comparison on that dimension. It is therefore logical to suspect that anchoring effects would emerge on measures of hostility but not on descriptively unrelated traits such as "stupid."

Unlike assimilation or anchoring, we observed no influence of the relation between primed and judged traits on correction effects. This is reasonable when we consider that correction must necessarily be mediated by conscious thought. Perceivers' corrections may be applied broadly in an effort to prevent the prime from influencing any of their judgments. Corrections would then be equally strong for primes with descriptive and evaluative implications.

Diagnosticity (morality/ability and valence). We coded whether the primed trait was related to the target's abilities (such as intelligence) or the target's morality and character (such as hostility). The analysis was restricted to studies using primes with descriptive implications for the judgment to ensure that the primed and the rated traits were either both related to ability or both related to morality. We additionally coded the evaluative nature of the primed trait for those studies that had a unipolar design. We could not include effects from bipolar designs in these analyses because those studies use two different sets of primes, typically opposite in valence. Our sample included studies with positive, neutral, and negative primes. Based on Skowronski and Carlston's (1989) work, we hypothesized that negative primes would have a greater impact on morality compared to ability judgments, whereas positive primes would have a greater impact on ability than morality judgments. The results of these analysis can be found in Table 9.

We could not perform a direct test of the hypothesized interaction because prime valence and morality/ability were confounded in our analyses due to missing cells. We might, however, make some indirect inferences based on the main effects and a descriptive knowledge of our sample. For assimilation, we observed a significant main effect of morality/ability, indicating that morality primes produced stronger effects than ability primes. Given that the majority of assimilation effects used negative primes, this finding provides some indirect support for our hypothesis that negative morality primes lead to stronger effects than negative ability primes. In fact, a direct test indicated that studies with negative morality primes had significantly stronger effects than studies with negative ability primes ($z = 2.08$, $p < .05$). We unfortunately lack the necessary information to determine whether positive ability primes lead to stronger effects than positive morality primes. Furthermore, a test of morality/ability could not be performed for anchoring or awareness effects.

Table 8. *Moderator Analyses for the Relation Between Primed and Judged Traits*

	Assimilation	Anchoring Contrast	Correction Contrast
Descriptive			
Number of effects	53	15	7
Number of participants	4084	895	385
Mean weighted *d*	0.3968	–0.6820	–0.5100
Evaluative			
Number of effects	43	13	6
Number of participants	2416	783	219
Mean weighted *d*	0.1987	–0.0310	–0.4531
Test	*Qb*[1] = 14.5063 ($p < .0001$)	*Qb*[1] = 42.4561 ($p < .0001$)	*Qb*[1] = 0.1090 ($p = .7413$)

Table 9. *Moderator Analyses for Diagnosticity*

	Assimilation	Anchoring Contrast	Correction Contrast
Positive ability			
(No effects)			
Positive morality			
Number of effects	6	1	1
Number of participants	283	83	42
Mean weighted *d*	0.4006	–0.4513	–.8594
Neutral ability			
(No effects)			
Neutral morality			
Number of effects	3		
Number of participants	241		
Mean weighted *d*	0.4907		
Negative ability			
Number of effects	3		
Number of participants	233		
Mean weighted *d*	0.2531		
Negative morality			
Number of effects	12	5	
Number of participants	583	239	
Mean weighted *d*	0.5791	–0.3171	
Test of valence	*Qb*[2] = 1.4905 (*p* = .4746)	*Qb*[1] = 0.2705 (*p* = .6030)	NA
Test of morality/ability	*Qb*[1] = 4.3011 (*p* = .0381)	NA	NA
Test of valence × morality/ability	NA	NA	NA

Note: Because this analysis is necessarily limited to descriptive primes, we conducted a separate analysis of valence including both evaluative and descriptive primes. The moderator analyses for assimilation and anchoring in the larger sample were both still nonsignifcant.

Nature of primes. The primes used in this literature can be placed into four categories: Some studies exposed participants to trait words; some required participants to read paragraphs or sentences related to a trait; some used real-world examples of individuals or things known to possess a trait (exemplars); and some were exposed to "scrambled behaviors." This last type of prime, introduced in Srull and Wyer (1979), involved showing participants a number of four-word groups. In each group, three of the words represented a behavior with trait implications (e.g., "break his arm"), whereas the fourth word was irrelevant. The four words were presented in a scrambled order, and participants were asked to underline the three that could be used to form a complete sentence. The results of the moderator analyses for the nature of the primes appear in Table 10.

Assimilation and correction effects are moderated by the nature of the primes. From an accessibility perspective, it is logical to assume that rich and focused trait primes should lead to a greater activation of the

Table 10. *Moderator Analyses for the Nature of Primes*

	Assimilation	Anchoring Contrast	Correction Contrast
Trait words			
Number of effects	19		2
Number of participants	1589		63
Mean weighted *d*	0.3261		–0.2881
Trait-related sentence or paragraph			
Number of effects	11	4	4
Number of participants	827	320	375
Mean weighted *d*	0.5420	–0.6489	–0.5615
Exemplars			
Number of effects	12	9	
Number of participants	581	489	
Mean weighted *d*	0.3162	–0.4224	
Scrambled behaviors			
Number of effects	10	3	2
Number of participants	1615	360	389
Mean weighted *d*	0.2961	–0.4967	–0.8732
Test	*Qb*[3] = 8.7974 (*p* = .0321)	*Qb*[2] = 2.3917 (*p* = .3025)	*Qb*[2] = 6.8777 (*p* = .0321)

relevant trait than impoverished and unfocused primes. The moderator analysis revealed that trait-related sentences or paragraphs result in the largest assimilation effects, followed by the other three types of primes, which result in about equally strong effects. A similar but nonsignificant pattern can be found in anchoring effects. Trait-related sentences or paragraphs likely encourage people to process the greatest amount of trait-relevant information of all the priming types because they are directly related to the trait and provide a concrete behavioral example. Trait words are strongly related to the trait concept but require little active interpretation and do not offer the same richness that a passage offers. Exemplars, by their very nature, possess a multitude of characteristics, only one of which is the trait of interest. Those characteristics that are not related to the trait of interest might interfere with thoughts of the critical trait. Finally, although scrambled behaviors and trait-related sentences both have a similar relation to the primed trait, the nature of the unscrambling task causes people to focus on the grammatical structure rather than the semantic interpretation of the behaviors. This may distract participants from the trait implications of the behavior.

For correction effects, we see a somewhat different pattern. In this case, both trait-related sentences and scrambled behaviors result in strong effects. An important similarity between these two types of primes is that they both involve behaviors. We speculate that behavioral primes may create larger correction-based contrast effects because of the spontaneous trait inference process (Winter & Uleman, 1984). Research has shown that when perceivers read about behaviors performed by a target, they spontaneously associate the target with traits implied by the behaviors. After viewing a behavioral prime, perceivers may believe that they created part of the bias themselves when they performed the trait inference. This could cause them to feel "responsible" for the bias, providing them with greater motivation to correct their initial impressions. This explanation is consistent with the findings of Martin et al. (1990), who showed that correction-based contrast effects emerged when participants had individual responsibility for rendering a judgement of a target, but that assimilation occurred when participants shared responsibility for rendering the judgment.

The nature of the prime did not moderate anchoring effects. Extrapolating from the inclusion–exclusion model (Schwarz & Bless, 1992), we might have expected that more individualized, "narrow" primes (such as exemplars) might be less effective for creating assimilation or more effective for creating anchoring because exemplars have clearly defined boundaries that make them more difficult to include in the target. Although the moderator analyses failed to show such patterns, this is not truly evidence against this theory. What matters is the construct that becomes activated by the primes, rather than the specific nature of the primes themselves. Stapel and Koomen (1998) demonstrated that individualized primes, such as exemplars, can produce assimilation effects if they activate a general mental construct, such as a trait or stereotype. The exemplars (and the contexts under which those exemplars were presented) producing assimilation effects are therefore likely different from those producing anchoring effects. For example, Herr (1986) was able to control whether exemplars were assimilated or used as standards of comparison by manipulating their extremity. In this case, we would suspect that moderate primes activated a general trait construct, whereas extreme primes activated the representation of an exemplar.

Priming method. Using the idea of depth of processing (Craik & Lockhart, 1972), we divided our studies into four groups based on how participants were asked to process the primes. Some studies presented the primes visibly but did not have participants work with them in any way. For example, Stapel and Koomen (1997) included exemplars in participants' instructions before reading about a target person. Some, such as Higgins et al. (1977), asked participants to remember the primes for a recall task to come later. Sometimes the primes were presented as part of a procedural task so that participants primarily worked with the structure of the primes rather than with their meaning. For example, Srull and Wyer (1980) exposed participants to primes as they unscrambled words in a sentence. Finally, some methodologies had participants focus on the semantic content of the primes. For example, in one condition, Smith and Branscombe (1988) asked participants to determine whether each item in a list of traits was positive, negative, or neutral. In addition to these, we included a fifth category for subliminally presented primes, as this seemed to be substantially different from other forms of simple presentation. The results of the moderator analyses for priming method appear in Table 11.

Priming method does not appear to moderate assimilation or correction effects but does significantly moderate anchoring effects. Specifically, semantic tasks produce the strongest anchoring effects, whereas simple presentation, memory tasks, and procedural tasks all result in smaller effects of approximately equal magnitude. By definition, semantic tasks, more than any other type of priming method, focus perceivers on the meaning of the primes. When the prime meaning is quite salient, this highlights the prime's potential relevance to the target, making it particularly likely to be used as a standard of comparison.

Processing capacity. Several researchers examined how priming effects changed when perceivers were placed under cognitive load. Most of these studies were designed to examine the theory that people can perform correction only when they have sufficient

Table 11. *Moderator Analyses for Priming Method*

	Assimilation	Anchoring Contrast	Correction Contrast
Simple presentation			
Number of effects	8	3	
Number of participants	620	236	
Mean weighted *d*	0.3217	-0.4099	
Memory task			
Number of effects	1	3	1
Number of participants	889	193	41
Mean weighted *d*	0.3520	–0.4420	–0.3908
Procedural task			
Number of effects	15	5	4
Number of participants	1954	469	450
Mean weighted *d*	0.289	–0.4105	–0.6240
Semantic task			
Number of effects	8	6	5
Number of participants	574	387	292
Mean weighted *d*	0.4726	–0.7831	–0.6807
Subliminal			
Number of effects	10		
Number of participants	656		
Mean weighted *d*	0.3929		
Test	$Qb[4] = 4.1332$ ($p = .3883$)	$Qb[3] = 8.2712$ ($p = .0407$)	$Qb[2] = 0.7559$ ($p = .6853$)

processing capacity. To test this hypothesis meta-analytically, we selected the set of effects in which participants were made aware of the influence of the primes. Under normal situations, we would expect people to correct their impressions, leading to evaluations that are biased away from the primes. We wanted to determine if reduced processing capacity would prevent people from performing correction, resulting in an overall assimilative effect. Note that this analysis necessarily includes effects from both the assimilation and correction literatures. The results of this analysis are presented in Table 12.

We clearly see that participants who had full processing capacity contrasted their judgments away from the primes, whereas those with reduced processing capacity assimilated their judgments toward the primes. This pattern replicates those typically found in primary research (e.g., Martin et al., 1990), supporting the hypothesis that assimilation effects occur automatically but that people with sufficient capacity can consciously correct for the influence of the primes. A secondary analysis indicates that the assimilation effect shown by participants who are aware of primes but have reduced processing capacity is not significantly different from that shown by participants who are unaware of the primes, $Qb(1) = 1.1632$, $p = 0.2808$.

Table 12. *Moderator Analysis for Processing Capacity*

Normal capacity	
Number of effects	11
Number of participants	897
Mean weighted *d*	–0.6631
Reduced capacity	
Number of effects	4
Number of participants	158
Mean weighted *d*	0.5280
Test	$Qb[1] = 44.9088$ ($p < .0001$)

Object of impression. Most of effects were based on conditions under which participants formed impressions of written materials, most commonly Higgins et al.'s (1977) or Srull and Wyer's (1979) Donald paragraphs. A few studies had participants form impressions of live or recorded individuals. The results of the moderator analyses of the object of impression appear in Table 13.

The object of the impression had a significant influence on assimilation effects, such that primes have a stronger effect on impressions of written descriptions than on impressions of live or recorded targets. The object of impression did not moderate the strength of correction, although this may have been caused by the small number of participants exposed to live or recorded targets. There were no examples of anchoring that used a live or recorded person as a target, so no test could be performed.

There are two possible explanations for why assimilation effects may be larger for written materials. One explanation concerns the linguistic nature of priming. Some of the earliest demonstrations of priming in the cognitive literature illustrated how the presentation of one word could facilitate recognition of another (e.g., Meyer & Schvaneveldt, 1971). If we think about what purpose priming might serve in human cognition, one plausible explanation is that it is designed to facilitate linguistic processing. Even though it is an everyday oc-

Table 13. *Moderator Analyses for the Object of Impression*

	Assimilation	Anchoring Contrast	Correction Contrast
Live person/recording of person			
Number of effects	6		1
Number of participants	286		22
Mean weighted *d*	0.0885		–0.1020
Written description			
Number of effects	42	12	8
Number of participants	4391	1109	847
Mean weighted *d*	0.3637	–0.5180	–0.7005
Test	*Qb*[1] = 5.0664 (*p* = .0244)	NA	*Qb*[1] = 1.9346 (*p* = .1643)

currence, face-to-face communication is truly a daunting task from an information-processing perspective. People talk at a rate of approximately 140 words per minute, with each selected from a lexicon of roughly 20,000 to 60,000 words (Semin, 2000). This activity could be made much simpler if the lexicon could be reduced to the words that are most likely to be used in the present conversation. Priming may have developed to act as a filter, restricting the competition of words to those most relevant to the topic at hand. If the purpose of priming is to facilitate linguistic communication, it may have its strongest effects on linguistic stimuli.

Another possible explanation for this effect is that trait primes are most effective if the target and prime are processed through the same modality. Carlston's (1994) associated systems theory suggests that impressions consist of information derived from four primary mental systems: the verbal, visual, affective, and behavioral. Each of these systems is associated with a particular type of mental representation. Of most relevance here is that traits are the representations associated with the verbal system. Cognitive psychologists have demonstrated that use of a processing system can facilitate subsequent processing fluency of related information (e.g., Bryden & Ley, 1983; Kroll & Potter, 1984). Thus, a trait prime may activate the verbal system, perhaps "warming it up" for processing other verbal materials. This could explain why trait primes seem particularly effective in conjunction with verbal targets. We are not suggesting that trait primes have an effect only on the interpretation of verbally presented targets. Instead, we merely hypothesize that a match between the modalities of the prime and target might lead to larger priming effects.

Type of dependent measure. Studies in our sample collected responses in one of two ways. Most measured participants' impressions using rating scales, but a few allowed participants to provide open-ended descriptions that were then coded as being similar to or different from the primed trait. The results of the moderator analyses for the type of dependent measure appear in Table 14.

The type of dependent measure does not appear to influence assimilation effects but does influence the amount of correction. The influence on anchoring could not be tested because all studies investigating anchoring effects used rating scales. Correction effects are greater when evaluations of targets are collected using scales than when assessed using an open-ended format. One possible explanation is that it is easier to apply a correction when working with a scale response. Suppose participants are primed with a trait and are later made aware of this potential bias. They may reason, "I would have rated the target as a 7, but to correct for the prime, I'll drop it down to a 4." The use of a rating scale may make it very easy for people to provide a more extreme prime-inconsistent response. However, these adjustments may be more difficult to make when providing an open-ended response. Participants may not know what characteristics of the target they should emphasize in their essay to offset the influence of the prime.

Table 14. *Moderator Analyses for the Type of Dependent Measure*

	Assimilation	Anchoring Contrast	Correction Contrast
Rating scale			
Number of effects	43	12	9
Number of participants	3915	1169	721
Mean weighted *d*	0.3601	–0.5105	–0.7947
Open-ended judgment			
Number of effects	7		3
Number of participants	1006		189
Mean weighted *d*	0.3216		–0.1854
Test	*Qb*[1] = 0.2922 (*p* = .5888)	NA	*Qb*[1] = 13.5817 (*p* = .0002)

The use of a rating scale could additionally increase participants' awareness of the prime. With a scale response, the primed dimension is made salient because the trait label (or a close synonym) is explicitly mentioned in the question used to collect the rating. Seeing the primed trait listed in the rating scale provides participants with another opportunity to become aware of the influence of the primes. In an open-ended response, participants are never asked directly to evaluate the target in terms of the primed construct. Therefore, participants filling out a rating scale are likely be more aware of the primes than those answering an open-ended question, which logically should result in larger correction effects.

Type of comparison. As discussed previously, studies in this literature used different groups in their statistical comparisons. Those using what we call a unipolar design had an experimental group that received strong priming of a particular trait and a control group that received either weaker or no priming of that trait. Those using what we call a bipolar design had two groups, each of which was primed with a different trait. Both groups were then asked to form an impression of a stimulus that could be interpreted in terms of either trait. The results of the moderator analyses for the type of comparison appear in Table 15.

No significant difference between unipolar and bipolar designs was found for assimilation or correction effects. For anchoring, bipolar designs generated significantly larger effects than those based on unipolar designs. Besides priming two groups of participants with different traits, bipolar designs differ from unipolar designs in terms of the response scale used. When using a close-ended trait judgment as the dependent measure in a bipolar design, the response scale is typically a semantic differential (e.g., friendly–hostile). For a unipolar design, the dependent measure is typically a Likert-type scale (e.g., not at all hostile–very hostile). When asked to judge the target, the use of a scale with opposite-trait end-points may lead to a reported anchoring effect that is even larger than originally perceived. The comparative nature of the bipolar scale may make the discrepancy between the prime and the target more obvious, leading to larger effects.

Publication location. The *Journal of Personality and Social Psychology*, the *Journal of Experimental Social Psychology*, and the *Personality and Social Psychology Bulletin* were the most prestigious places to publish priming studies. We wanted to determine whether this prestige might be associated with stronger or weaker effects. We placed all articles published in any of these three journals into one category and all other articles into a different category. The results for the moderator analyses of publication location appear in Table 16. These analyses indicate that publication

Table 15. *Moderator Analyses for the Type of Comparison*

	Assimilation	Anchoring Contrast	Correction Contrast
Unipolar			
Number of effects	17	3	1
Number of participants	1601	322	42
Mean weighted *d*	0.2780	–0.2591	–0.7731
Bipolar			
Number of effects	27	8	7
Number of participants	2948	847	702
Mean weighted *d*	0.3453	–0.5921	–0.8053
Test	*Qb*[1] = 1.1695 (*p* = .2795)	*Qb*[1] = 8.3378 (*p* = .0039)	*Qb*[1] = 0.00004 (*p* = .9950)

Table 16. *Moderator Analyses for Publication Location*

	Assimilation	Anchoring Contrast	Correction Contrast
JPSP, *JESP*, *PSPB*			
Number of effects	31	7	7
Number of participants	3675	945	787
Mean weighted *d*	0.3686	–0.4992	–0.6953
Other locations			
Number of effects	14	4	2
Number of participants	1118	224	83
Mean weighted *d*	0.3063	–0.5594	–0.5803
Test	*Qb*[1] = 0.8113 (*p* = .3677)	*Qb*[1] = 0.1570 (*p* = .6919)	*Qb*[1] = 0.2365 (*p* = .6268)

Note: JPSP = Journal of Personality and Social Psychology, *JESP = Journal of Experimental Social Psychology*, *PSPB = Personality and Social Psychology Bulletin*.

location has no effect on the strength of assimilation, anchoring, or correction effects.

Awareness check. A number of studies included procedures to determine if participants were aware of the priming manipulation and its connection to their judgments. Those using supraliminal priming typically asked if participants noticed a connection between the priming and impression formation phases of the experiment. Those using subliminal priming typically measured the proportion of priming stimuli that were visible. Studies that included an awareness check typically excluded participants that indicated a heightened awareness of the priming stimuli. The results of the moderator analyses for the presence of an awareness check appear in Table 17.

We can see that for all types of priming effects, studies that included an awareness check appear to have significantly smaller effects than those that did not include an awareness check. In general, the inclusion of an awareness check indicates greater experimental rigor. Our results suggest that studies with less rigorous methodologies may have inflated estimates of the effects of priming.

A General Model of Informational Biases

In our introduction, we reviewed a number of different theories explaining priming effects, each describing how a particular type of priming works within a particular domain. To date, there has been no attempt to incorporate all priming effects within a single, unified theory. To fill this void, we propose a general model that describes the mental processes responsible for assimilation, anchoring, and correction effects, as well as how these are each influenced by moderating variables. We base our theory on the results of this meta-analysis, as well as several models previously generated by other researchers. We hope to demonstrate that our theory successfully explains the influence of priming on impressions and that it can also be used to help understand how irrelevant information can bias judgments more generally. Following the presentation of our model, we describe the implications it holds for a diverse range of topics, including priming, chronic accessibility, context effects, and stereotyping.

Existing Theories Related to Informational Biases

It is well known that people are not objective information processors. When asked to make judgments, people make use of logically relevant information, but are also affected by other aspects of the context. As mentioned earlier, Schwarz and Bless (1992) proposed that the initial influence of an irrelevant contextual stimulus depends on whether it is included with or excluded from the target. Stimuli that are included with the target become incorporated into its mental representation, biasing judgments toward the context. Excluded stimuli can instead be used as standards of comparison, resulting in judgments that are biased away from the context.

Whether a particular stimulus is included or excluded depends on the degree to which it matches the general characteristics of the target (Schwarz & Bless, 1992). Stimuli that are inconsistent with targets (such that the characteristics present in the target imply the absence of characteristics present in the stimulus) tend to be excluded, whereas those that are consistent with targets tend to be included. Schwarz and Bless proposed that an important determinant of the consistency between the stimulus and the target is the specificity with which they are defined. The more specifically either is defined, the more likely the context will be excluded from the target. Specifically defined stimuli are more likely to include idiosyncratic features that are incompatible with the target. Similarly, specifically defined targets provide a more complex set of criteria that stimuli need to match to be included. Broadly defined stimuli or targets present fewer opportunities for mismatches and so will more likely result in the context being included in the target's representation.

The process by which inclusion leads to assimilation and exclusion leads to anchoring may be related to *selective accessibility.* Mussweiler (2003) proposed

Table 17. *Moderator Analyses for Awareness Check*

	Assimilation	Anchoring Contrast	Correction Contrast
Awareness check			
Number of effects	30	5	3
Number of participants	3186	462	208
Mean weighted *d*	0.3051	–0.3142	–0.3325
No awareness check			
Number of effects	23	8	7
Number of participants	1607	707	661
Mean weighted *d*	0.4426	–0.6408	–0.7967
Test	*Qb*[1] = 4.8954 (*p* = .0269)	*Qb*[1] = 7.1813 (*p* = .0074)	*Qb*[1] = 8.2153 (*p* = .0042)

that social judgments always take place in a comparative context. He argued that when asked to judge a target, people first select a relevant standard, compare it to the target, and finally integrate the outcome of the comparison into their evaluation. Assimilation and anchoring effects primarily differ in the way that targets are compared to the standard. When the target appears to share surface characteristics with the standard (as is the case with included primes), people engage *similarity testing*, whereby they search for features that the standard and target have in common, making them highly accessible. This makes aspects of the target that are consistent with the standard more likely to be used in the judgment, leading to assimilation effects. When the target does not share surface characteristics with the standard (as is the case with excluded primes), people engage *dissimilarity testing*, whereby they search for differences between the target and the standard. In this case, the aspects of the target that are inconsistent with the standard become highly accessible, leading to anchoring effects.

Research suggests that both including (assimilation) and excluding (anchoring) primes can occur automatically. Evidence for the automaticity of assimilation effects has been provided by Bargh and Pietromonaco (1982), who found assimilation effects due to primes presented outside of awareness, and Thompson, Roman, Moskowitz, Chaiken, and Bargh (1994), who demonstrated that assimilation is not influenced by the presence of a cognitive load. Evidence for the automaticity of anchoring effects is provided by researchers such as Moskowitz and Skurnik (1999), who have shown that anchoring effects are unaffected by cognitive load, and Weary and Reich (2001), who demonstrated an automatic anchoring effect in the domain of chronic future-event expectancies.

Contextual stimuli can also elicit reactions beyond these automatic effects. When people are asked to evaluate a target, they usually try to do so in the most correct and unbiased way that they can. Therefore, when people become aware that irrelevant information may have influenced their judgment, they usually try to consciously correct their opinion to counteract the bias (Martin, 1986). Based on this phenomenon, Wegener and Petty (1995) proposed that biasing information can have two distinct effects on judgments. In their *flexible correction model*, default processing first has the opportunity to create assimilation or contrast effects on judgments. Then, if people become aware of the bias and have sufficient motivation and capacity, they may additionally alter their judgment through conscious correction. The net effect of a contextual stimulus on a judgment can be found by combining the default and corrective effects.

According to this model, the way that people correct for a bias depends on how they perceive it affected their judgment (Wegener & Petty, 1995). If they believe that their judgments were made more similar to the biasing information, they perform corrective contrast to make them less similar. Conversely, if people think that their judgments were made less similar to the biasing information, they perform corrective assimilation to make them more similar. Wegener and Petty referred to the beliefs people have about the influence of biasing information on their judgments as "naive theories." When people decide to correct their judgments, there is no guarantee that these corrections will be related to the true bias in either strength or direction. Indeed, primary research has typically shown that people have a strong tendency to overcorrect for perceived biases (Martin, 1986; Martin et al., 1990).

With the explanation of default processing drawn from Schwarz and Bless (1992) and the explanation of corrective processing drawn from Wegener and Petty (1995), all that lacks for a complete theory of how informational biases affect judgments is a framework that can explain their respective roles. We believe that such a framework can be found in Smith and DeCoster's (2000) generalized dual-process theory. These researchers propose that there are two basic ways that people process social information. First, people have an "associative" processing mode that operates automatically and makes use of simple memory traces that are formed whenever two stimuli occur together in the environment. Second, people have a "rule-based" processing mode that operates with conscious attention and makes use of more complex, linguistic information. Smith and DeCoster proposed that whenever people observe a stimulus, it is automatically subjected to associative processing. Associative processing takes little effort and can typically be performed even in the presence of other demands on attention. Rule-based processing takes a substantial amount of mental effort, however, so it is only performed when people possess strong motivations and have available capacity. When people expend the effort to perform rule-based processing, it does not supplant associative processing. Instead the two modes operate in parallel, with each providing its own contribution.

Synthesis of Existing Theories to Form a General Model of Informational Bias

We believe that biasing information can influence judgments through two independent modes. First, information can directly influence judgments through default processing, which creates the initial bias in people's responses. Assuming that this is based on the associative mode in Smith and DeCoster's (2000) model, we believe that default processing proceeds automatically and requires little conscious attention. People can also choose to engage corrective processing in response to the biasing influence of default processing. Assuming that this is based on the rule-based mode in

Smith and DeCoster's model, we believe that corrective processing takes place only in circumstances in which people have sufficient motivation and capacity. A representation of our model is presented in Figure 1.

As noted in the top half of Figure 1, the amount of bias created through default processing depends on the extent to which a construct is made accessible and its relevance to the judgment. The more a construct is activated, the stronger an effect it will have (although this influence declines over time). The strength of its influence also depends on the relation between the activated construct and the constructs involved in the judgment. The more applicable the primed construct is to the target, the stronger an effect it will have. Additionally, contextual information directly related to the judged dimension will have larger effects than other types of information.

The direction of the default impact of biasing information on a judgment depends on whether the information is included with or excluded from the target. We believe that information that is included with the target becomes incorporated in its mental representation, leading to default assimilation effects, whereas information that is excluded from the target is used to anchor the judgment, leading to default contrast effects. As originally proposed by Schwarz and Bless (1992), whether information is included or excluded is determined primarily by the extent to which the activated construct has components that are inconsistent with the target. The more distinct the activated construct and the target are, the more likely that the construct will be excluded from the target. One of the primary determinants of consistency is the specificity of the biasing information. Information that activates a specific mental construct (such as an exemplars) tends to be used as a scale anchor, leading to default contrast. On the other hand, information that activiates a general mental construct (such as a trait) tends to be incorporated in the target, leading to default assimilation.

If individuals believe a piece of contextual information may bias their judgments, they may attempt to correct for that bias. As shown in the bottom of Figure 1, such correction occurs when perceivers have awareness, motivation, and processing capacity. People do not correct their judgments if they fail to notice the biasing information or believe that the judgment is inconsequential. Additionally, under circumstances whereby people wish to correct their judgments, they will only be able to do so if they have sufficient processing capacity. The direction and amount of corrective processing depends on the "naive theories" possessed by perceivers regarding how their judgment was biased. As originally proposed by Wegener and Petty (1995), we believe that people try to correct their judgment in a way that opposes the direction of the theorized bias. If people suspect that in-

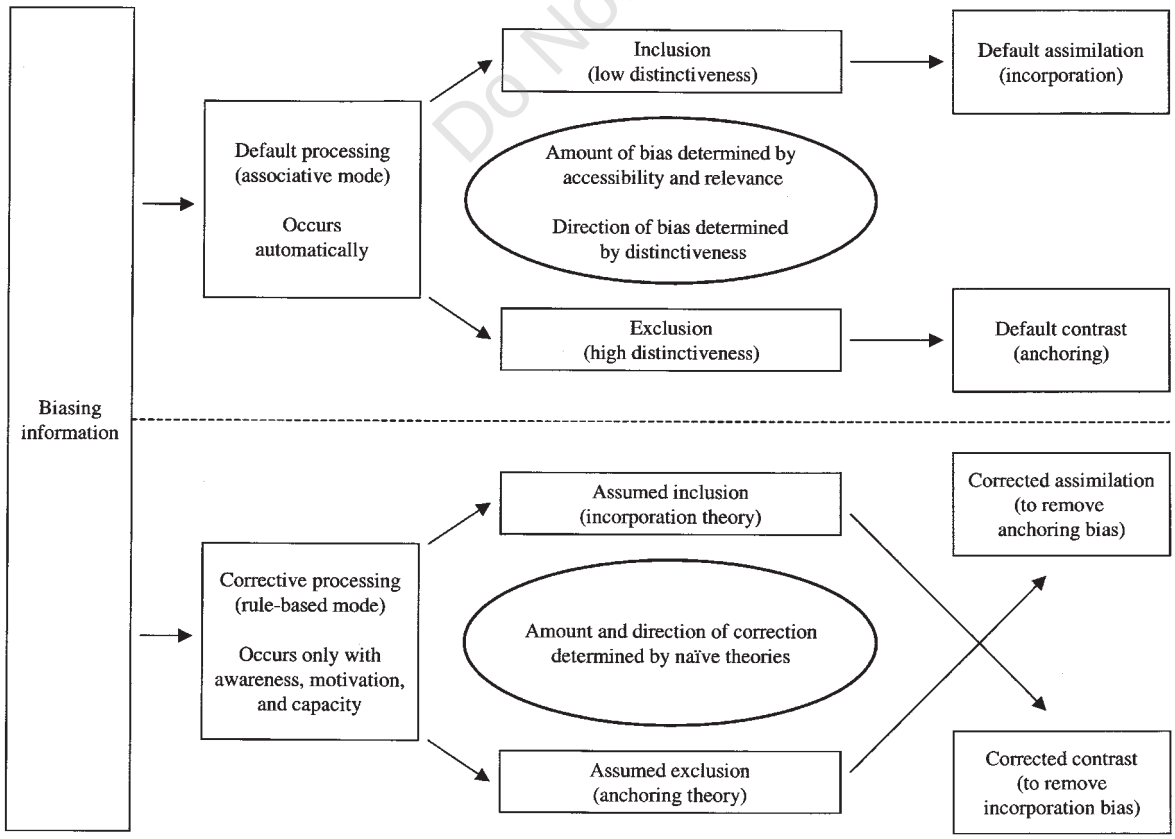

Figure 1. A general model of informational biases.

appropriate information has become incorporated in their representation of the target (resulting in default assimilation), they will apply corrective contrast. If people suspect that their judgment has been biased by a salient standard of comparison (resulting in default contrast), they will apply corrective assimilation. Additionally, people apply a larger correction if they believe that their judgment was strongly biased than if they believe it was only weakly biased (Wegener & Petty, 1995). Because it is possible for people to possess erroneous theories, the amount and direction of corrective processing is not necessarily related to the true amount and direction of the original default processing bias.

Biasing information can therefore have both default and corrective effects on a judgment. The net effect can be determined by simply adding together the influences of default and corrective processing. However, we propose that information can only induce a single default effect and a single corrective effect on a specific judgment. Although default and corrective processing can occur concurrently, a single piece of information cannot be both included in and excluded from the target when making an evaluation, nor can perceivers simultaneously believe that their judgment was both biased toward and biased away from a stimulus. Therefore, we do not believe that information can be simultaneously incorporated with the target and used as a standard of comparison (although we do allow that a prime could be included in one judgment of a target while excluded from another, as demonstrated by Mussweiler & Strack, 2000), nor can information induce both corrective assimilation and corrective contrast in the same judgment.

Evidence for the Model

Evidence for our model can be found in the existing literature as well as our meta-analysis. Several of our moderators provide support for the hypothesis that default effects depend on the accessibility and relevance of the primed constructs. The analysis of delay indicated that default assimilation effects tended to decrease as the length of time between the priming and impression tasks increased. This is consistent with the theory that the strength of default effects depends on accessibility, because accessibility is known to decay with time. The importance of relevance can be seen in the analysis of applicability, where we observed that primes had a significant default assimilation effect only when they were applicable to the target. Additional support was provided by the analysis of the relation between the primed and judged trait, in which we observed that both default assimilation and anchoring effects were stronger when the primes had descriptive implications for the judgment than when they only had evaluative implications. These results demonstrate that primes that are less relevant to either the target or the trait being judged have smaller effects than those that are more relevant. Our failure to find an influence of trait relation on correction effects is also consistent with the model, which proposes that corrective processing is not directly affected by relevance.

The meta-analysis additionally provides evidence that corrective processing requires conscious attention. In our analysis of processing capacity, we observed that participants corrected their impressions when made aware of the primes under normal circumstances but were unable to do so when their capacity was reduced. We also found no difference between assimilation conditions without a load compared to assimilation conditions with a load. This latter finding is consistent with the model's claim that the default effect of a stimulus is not dependent on conscious attention.

Our meta-analysis does not provide direct evidence that the direction of the default influence of a prime depends on its specificity. However, such evidence can be found in a series of studies conducted by Stapel and Koomen (1996) and Stapel, Koomen, and van der Pligt (1996). These authors have consistently demonstrated that primes typically resulting in assimilation are used as standards of comparison if they are made more individualized. For example, Stapel and Koomen demonstrated that trait-word primes tend to be assimilated in impressions but produce contrast effects if the traits are presented as descriptions of specific individuals (i.e., "conceited" vs. "Peter is conceited"). Similarly, Stapel et al. showed that behavioral primes tend to be assimilated in impressions unless the behaviors are associated with specific individuals. More generally, these researchers showed that primes resulting in the activation of a general trait construct tend to produce assimilation while primes resulting in the activation of a specific exemplar tend to produce contrast effects (Stapel & Koomen, 1997; Stapel, Koomen, & van der Pligt, 1997).

Evidence that the direction of the correction for prime depends on participants' naive theories has been provided by Wegener and Petty (1995). These authors developed manipulations that could induce participants to expect either that a given stimulus would become incorporated in their judgments or that it would be used as a standard of comparison. They then demonstrated that participants induced to believe that a stimulus was incorporated in their judgments performed corrective contrast, whereas those induced to believe that a stimulus acted as a standard of comparison performed corrective assimilation. They then extended these findings by demonstrating that assessments of participants' idiosyncratic beliefs about the influence of a stimulus could be used to predict the direction of their corrective processing in the absence of a manipulation.

Implications of the Model

Although the development of our model was originally based on priming research, we believe that it can be used to explain biases arising from a wide variety of information sources. One important factor discriminating potential sources is whether the source is a part of the perceiver's experience or is part of what is being perceived. A second is whether the information derives from permanent characteristics of the party involved (and so would be present any time the perceiver would judge the target) or from transitory aspects of the situation (and so are only present because of the specific circumstances that were in place at the time of judgment). In the following, we show how our model can be applied to research within each combination of these two factors. Some of the predictions we make could also be derived from the theories we used to form our model (Schwarz & Bless, 1992; Smith & DeCoster, 2000; Wegener & Petty, 1995), whereas others uniquely result from our synthesis.

Priming effects are caused by transitory information originating in the experience of the perceiver. In this case, the information comes from stimuli recently viewed by the perceiver that are logically irrelevant to their judgment. Although many of the implications of our model for trait-priming research have already been observed in the literature, there has been a noticeable lack of research on corrective assimilation. By default, people appear to believe that exposure to trait-related primes will lead to assimilation effects. In a recent study, Stapel et al. (1998) asked participants what they thought would be the effect of priming on impressions. Although most expected no effect, when pressed to choose either assimilation or contrast, an overwhelming majority believed that priming would cause assimilation. Given the predominance of assimilation theories, it is unsurprising that trait-priming research on correction has universally found contrast effects. Though corrected assimilation has yet to be demonstrated in the trait-priming literature, our model suggests that such an effect could occur. If a prime were sufficiently extreme, participants might develop a naive theory that it anchored their judgment. Alternatively, researchers could provide participants with a theory of bias, suggesting that exposure to a particular prime would lead to contrast. We would expect participants' judgments to show corrective assimilation under these circumstances.

Chronic accessibility is an example of bias caused by permanent information originating in the experience of the perceiver. The phenomenon of chronic accessibility is similar to priming, except that it considers naturally occurring individual differences in trait accessibility instead of differences created by the introduction of a prime. People with a chronically accessible trait have used it in past judgments so frequently that they are more likely to use it when evaluating new targets than other traits, even without recent priming (Bargh, Bond, Lombardi, & Tota, 1986). Research has also shown that the effects of chronic accessibility are fairly automatic (Bargh & Pratto, 1986; Bargh & Thein, 1985). We therefore believe it would fit into our model as an example of a default assimilation effect.

Although research has focused exclusively on the chronic accessibility of traits, it is interesting to speculate that people might also develop chronically accessible exemplars. We believe that frequent exposure to a particularly extreme exemplar, like Osama Bin Laden, could make it chronically accessible and automatically used as a standard of comparison when judging targets. This would lead to default contrast effects even in the absence of any manipulations of accessibility. We also suggest that researchers might measure the naive theories people have about the effects of a chronically accessible trait or exemplar to determine whether they can be used to predict the direction of correction for these effects.

The influence of transitory information present at the time of judgment has often been investigated under the rubric of "context effects." As an example, research on interpersonal attraction has demonstrated that men rate both known and unknown women as less attractive when they are placed in the context of unusually attractive women (Kenrick & Gutierres, 1980; Kenrick, Gutierres, & Goldberg, 1989). Our model explains these results by claiming that specific, extremely attractive individuals are very distinct and are therefore likely to be excluded from judgments of other targets, leading to default contrast effects. There is also evidence that people viewing pleasant movie scenes rate unfamiliar people as more attractive than those viewing unpleasant scenes (Friedman, Rubin, Jacobson, & Clore, 1978). The context is not individualized in this case so it may be incorporated in the judgment, leading to default assimilation effects. Assimilation and contrast context effects were examined together in a set of studies performed by Brown, Novick, Lord, and Richards (1992). These researchers found that participants' judgments of their own attractiveness were lower after viewing photographs of attractive others and higher after viewing photos of unattractive others. However, if the participants believed that the pictured individuals held similar attitudes and values, the reverse pattern was found. These findings show that contexts possessing a basis for inclusion cause default assimilation, whereas excluded contexts cause default contrast.

Although many researchers have documented the presence of context effects because of their potential role as experimental confounds, little research has examined either the process by which context effects occur or the influence of corrective instructions on these judgments. Our model claims that the effects that have been investigated so far represent the default process-

ing of the context, so they should proceed automatically and be influenced by the accessibility and relevance of the mental constructs activated by the context. We additionally propose that people can consciously correct for the influence of these effects and that these corrections depend on their naive theories regarding the effect of the bias.

Finally, stereotypes represent a permanent source of biasing information that is perceived at the time of judgment. It is fairly well established that exposure to a member of a social category activates the associated stereotype automatically (Bargh, 1999). The stereotype can then be used to fill in missing information about the target or to interpret behaviors the target performs. Because these represent incorporations of stereotypical information in the impression, we propose that these effects result from default assimilation. On the other hand, default contrast effects have been observed when targets fail to meet stereotypical expectations. Ho, Driscoll, and Loosbrock (1998) had participants grade the poor mathematical performance of either an Asian or a White target. They observed that participants assigned lower grades to Asian than to White targets under normal circumstances, indicating that the evaluations were contrasted with the stereotype. Additionally, the grade assignments did not differ when participants were provided with accuracy instructions, indicating that participants performed corrective assimilation when they had strong motivations.

Our model claims that the ease with which a stimulus can become included in a social judgment depends on the specificity with which either the stimulus or the target is defined. We therefore claim that stereotypes that have very specific content, such as behaviors or elements of physical appearance, are less likely to be assimilated into target impressions and more likely to be used as standards of comparison than stereotypes with more general content, such as traits. The principle of specificity also suggests that the more detail perceivers have about individual characteristics of the target, the more likely the stereotype is used as a standard of comparison. Finally, we also believe that participants' naive theories about the impact of stereotypes on judgments of social-category members predict the direction of conscious correction.

Other Implications of the Meta-Analysis

Although many of our results can be interpreted in terms of our general model of informational biases, we observed several additional findings that deserve independent attention. In the following we discuss our interpretation of these results as well as the implications they hold for future research on priming.

We had hoped to apply Skowronski and Carlston's (1989) research on trait diagnosticity to priming effects, but the present literature lacks the diversity required to draw any firm conclusions. Priming researchers have overwhelmingly preferred negative to positive primes and traits related to morality to those related to ability. For this reason, we were able to observe only that negative morality primes lead to stronger assimilation effects than negative ability primes. This is generally supportive of the notion that diagnostic primes lead to stronger effects than nondiagnostic primes. However, the negative morality primes necessarily involve a different set of traits than the negative ability primes. It may simply be that the morality primes were stronger than the ability primes used in these studies. If we could have also demonstrated that positive ability primes lead to stronger assimilation effects than positive morality primes, we would have been more certain in concluding that prime diagnosticity is an important moderator of priming effects. Unfortunately, there were no instances of positive ability primes in our sample of studies, preventing such an analysis. We suggest that this hypothesis be tested in primary research.

We considered the purpose of priming in human cognition in our interpretation of the moderating effect of the object of the impression. Even though our own conjectures must be labeled as speculative, we believe that this would be a very fruitful path of both theoretical consideration and empirical study. Although researchers have produced several theories explaining why we observe priming effects from a mechanical perspective, no one has produced a theory explaining why we observe priming effects from a functional perspective. Priming is implicated in many phenomena across both social and cognitive psychology, warranting a better understanding of its adaptive functions. We strongly encourage investigators to consider this in their future examinations of priming.

In addition to providing information about the factors that influence priming effects, our meta-analysis reveals that the situations under which they have been investigated have been very limited. Most of the studies were conducted in a college laboratory, and most limited their participant population to college students. Almost every study had participants form impressions of written vignettes instead of more realistic targets. Those studies using a unipolar design relied heavily on traits with negative connotations at the expense of positive and neutral traits. And finally, the delay between the presentations of the prime and the object of impression was rarely more than 10 min. The literature on contrast has been even more uniform. In addition to the limitations listed previously, no contrast studies have attempted to use subliminal priming, and none have examined the influence of the applicability of primes to the target. We wish to call attention to these deficits in the literature so that future researchers may fill in the gaps.

With more than a quarter century of research to draw on, we believe that it is an appropriate time to revise our understanding of how primes affect impressions. Rather than thinking of priming effects as simply being either assimilation or contrast, we believe that it is essential to additionally consider whether this resulted from either default or corrective processing. It is also important for those interested in this field to broaden their perspectives to see how their research might apply to other domains and what these domains may have to say about their own experimental programs. We hope that both the results of this meta-analysis and the framework provided by our generalized model of informational biases can aid future investigators in these endeavors.

References

References marked with an asterisk indicate studies included in the meta-analysis.

*Abreu, J. M. (1999). Conscious and nonconscious African American stereotypes: Impact on first impression and diagnostic ratings by therapists. *Journal of Consulting and Clinical Psychology, 67,* 387–393.

*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. (1999). The cognitive monster: The case against the controllability of automatic stereotype effects. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 361–382) New York: Guilford.

*Bargh, J. A., Bond, R. N., Lombardi, W. J., & Tota, M. E. (1986). The additive nature of chronic and temporary sources of construct accessibility. *Journal of Personality and Social Psychology, 50,* 869–878.

*Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology, 71,* 230–244.

*Bargh, J. A., Lombardi, W. J., & Higgins, E. T. (1988). Automaticity of chronically accessible constructs in person × situation effects on person perception: It's just a matter of time. *Journal of Personality and Social Psychology, 55,* 599–605.

*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.

Bargh, J. A., & Pratto, F. (1986). Individual construct accessibility and perceptual selection. *Journal of Experimental Social Psychology, 22,* 293–311.

Bargh, J. A., & Thein, R. D. (1985). Individual construct accessibility, person memory, and the recall-judgment link: The case of information overload. *Journal of Personality and Social Psychology, 49,* 1129–1146.

*Brotanek, T. F., & Kayson, W. A. (1996). Effects of type and relevance of primes and delay between priming and ratings on attractiveness. *Psychological Reports, 78,* 1251–1255.

Brown, J. D., Novick, N. J., Lord, K. A., & Richards, J. M. (1992). When Gulliver travels: Social context, psychological closeness, and self-appraisals. *Journal of Personality and Social Psychology, 62,* 717–727.

Bryden, M. P., & Ley, R. G. (1983). Right-hemispheric involvement in the perception and expression of emotion in normal humans. In K. M. Heilman & P. Satz (Eds.), *Neuropsychology of human emotion* (pp. 6–44). New York: Guilford.

Carlston, D. E. (1994). Associated systems theory: A systematic approach to cognitive representations of persons. In R. S. Wyer (Ed.), *Advances in social cognition* (Vol. 7, pp. 1–78). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

*Carver, C. S., Ganellen, R. J., Froming, W. J., & Chambers, W. (1983). Modeling: An analysis in terms of category accessibility. *Journal of Experimental Social Psychology, 19,* 403–421.

*Chen, M., & Bargh, J. A. (1997). Nonconscious behavioral confirmation processes: The self-fulfilling consequences of automatic stereotype activation. *Journal of Experimental Social Psychology, 33,* 541–560.

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York: Academic.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112,* 155–159.

Cooper, H. M. (1989). *Integrating research: A guide for literature reviews* (2nd ed.). Newbury Park, CA: Sage.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671–684.

DeCoster, J. (2002). *Notes on meta-analysis.* Retrieved May 12, 2002, from http://www.stat-help.com/notes.html

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

Eiser, J. R. (1990). *Social judgment.* London: Open University Press.

*Erber, J. T., Caiola, M. A., Williams, M., & Prager, I. G. (1997). Age and forgetfulness: The effect of implicit priming. *Experimental Aging Research, 23,* 1–12.

*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.

*Fazio, R. H., Powell, M. C., & Herr, P. M. (1983). Toward a process model of the attitude–behavior relation: Accessing one's attitude upon mere observation of the attitude object. *Journal of Personality and Social Psychology, 44,* 723–735.

*Ford, T. E., & Kruglanski, A. W. (1995). Effects of epistemic motivations on the use of accessible constructs in social judgment. *Personality and Social Psychology Bulletin, 21,* 950–962.

Friedman, H. S., Rubin, Z., Jacobson, J., & Clore, G. L. (1978). Induced affect and attraction toward dating partners and opposite-sex strangers. *Representative Research in Social Psychology, 9,* 57–63.

Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research.* Beverly Hills, CA: Sage.

*Goncalves, O. F., & Ivey, A. E. (1987). The effects of unconscious presentation of information on therapist conceptualizations, intentions, and responses. *Journal of Clinical Psychology, 43,* 237–245.

*Herr, P. M. (1986). Consequences of priming: Judgment and behavior. *Journal of Personality and Social Psychology, 51,* 1106–1115.

*Herr, P. M., Sherman, S. J., & Fazio, R. H. (1983). On the consequences of priming: Assimilation and contrast effects. *Journal of Experimental Social Psychology, 19,* 323–340.

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

Higgins, E. T., Bargh, J. A., & Lombardi, W. J. (1985). Nature of priming effects on categorization. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 11,* 59–69.

Higgins, E. T., & Brendl, C. M. (1995). Accessibility and applicability: Some "activation rules" influencing judgment. *Journal of Experimental Social Psychology, 31,* 218–243.

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

Ho, C. P., Driscoll, D. M., & Loosbrock, D. (1998). Great expectations: The negative consequences of falling short. *Journal of Applied Social Psychology, 28,* 1743–1759.

*Ikegami, T. (1993). Positive–negative asymmetry of priming effects on impression formation. *European Journal of Social Psychology, 23,* 1–16.

*Ikegami, T., & Kawaguchi, J. (1989). Effects of conscious and subconscious processing of hostility- or friendliness-related words on the personality impression of others. In A. F. Bennett & K. M. McConkey (Eds.), *Cognition in individual and social contexts* (pp. 381–389). North Holland: Elsevier Science.

Johnson, B. T. (1989). *DSTAT: Software for the meta-analytic review of research literatures.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Kenrick, D. T., & Gutierres, S. E. (1980). Contrast effects and judgments of physical attractiveness: When beauty becomes a social problem. *Journal of Personality and Social Psychology, 38,* 131–140.

Kenrick, D. T., Gutierres, S. E., & Goldberg, L. L. (1989). Influence of popular erotica on judgments of strangers and mates. *Journal of Experimental Social Psychology, 25,* 159–167.

*Kinicki, A. J., Hom, P. W., Trost, M. R., & Wade, K. J. (1995). Effects of category prototypes on performance-rating accuracy. *Journal of Applied Psychology, 80,* 354–370.

Kroll, J. F., & Potter, M. C. (1984). Recognizing words, pictures and concepts: A comparison of lexical, object and reality decisions. *Journal of Verbal Learning and Verbal Behavior, 23,* 39–66.

*Levy, B. (1996). Improving memory in old age through implicit self-stereotyping. *Journal of Personality and Social Psychology, 71,* 1092–1107.

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

*Martin, L. L., Seta, J. J., & Crelia, R. A. (1990). Assimilation and contrast as a function of people's willingness and ability to expend effort in forming an impression. *Journal of Personality and Social Psychology, 59,* 27–37.

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology, 90,* 227–234.

*Moskowitz, G. B., & Roman, R. J. (1992). Spontaneous trait inferences as self-generated primes: Implications for conscious social judgment. *Journal of Personality and Social Psychology, 62,* 728–738.

Moskowitz, G. B., & Skurnik, I. W. (1999). Contrast effects as determined by the type of prime: Trait versus exemplar primes initiate processing strategies that differ in how accessible constructs are used. *Journal of Personality and Social Psychology, 76,* 911–927.

Mussweiler, T. (2003). Comparison processes in social judgment: Mechanisms and consequences. *Psychological Review, 110,* 472–489.

Mussweiler, T., & Strack, F. (2000). The "relative self": Informational and judgmental consequences of comparative self-evaluation. *Journal of Personality and Social Psychology, 79,* 23–38.

Newell, A., & Rosenbloom, P. S. (1981). Mechanisms of skill acquisition and the law of practice. In J. R. Anderson (Ed.), *Cognitive skills and their acquisition* (pp. 1–55). Hillsdale, NJ, Lawrence Erlbaum Associates, Inc.

*Newman, L. S., Duff, K. J., Hedburg, D. A., & Blitstein, J. (1996). Rebound effects in impression formation: Assimilation and contrast effects following thought suppression. *Journal of Experimental Social Psychology, 32,* 460–483.

*Philippot, P., Schwarz, N., Carrera, P., De Vries, N., & Van Yperen, N. W. (1991). Differential effects of priming at the encoding and judgment stage. *European Journal of Social Psychology, 21,* 293–302.

*Reeves, B., & Garramone, G. M. (1983). Television's influence on children's encoding of person information. *Human Communication Research, 10,* 257–268.

Rosenthal, R., & Rubin, D. B. (1986). Meta-analytic procedures for combining studies with multiple effect sizes. *Psychological Bulletin, 99,* 400–406.

*Schneider, D. J., & Blankmeyer, B. L. (1983). Prototype salience and implicit personality theories. *Journal of Personality and Social Psychology, 44,* 712–722.

Schwarz, N., & Bless, H. (1992). Constructing reality and its alternatives: An inclusion/exclusion model of assimilation and contrast effects in social judgments. In L. L. Martin & A. Tesser (Eds.), *The construction of social judgments* (pp. 217–245). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

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

Semin, G. R. (2000). Agenda 2000—Communication: Language as an implementational device for cognition. *European Journal of Social Psychology, 30,* 595–612.

*Sinclair, R. C., Mark, M. M., & Shotland, R. L. (1987). Construct accessibility and generalizability across response categories. *Personality and Social Psychology Bulletin, 13,* 239–252.

Skowronski, J. J., & Carlston, D. E. (1989). Negativity and extremity biases in impression formation: A review of explanations. *Psychological Bulletin, 105,* 131–142.

*Skowronski, J. J., Carlston, D. E., & Isham, J. T. (1993). Implicit versus explicit impression formation: The differing effects of overt labeling and covert priming on memory and impressions. *Journal of Experimental Social Psychology, 29,* 17–41.

*Smith, E. R., & Branscombe, N. R. (1987). Procedurally mediated social inferences: The case of category accessibility effects. *Journal of Experimental Social Psychology, 23,* 361–382.

*Smith, E. R., & Branscombe, N. R. (1988). Category accessibility as implicit memory. *Journal of Experimental Social Psychology, 24,* 490–504.

Smith, E. R., & DeCoster, J. (1998). Knowledge acquisition, accessibility, and use in person perception and stereotyping: Simulation with a recurrent connectionist network. *Journal of Personality and Social Psychology, 74,* 21–35.

Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review, 4,* 108–131.

*Southwick, L., Steele, C., & Lindell, M. (1986). The roles of historical experience and construct accessibility in judgments about alcoholism. *Cognitive Therapy and Research, 10,* 167–185.

*Srull, T. K., & Wyer, R. S., Jr. (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.

*Srull, T. K., & Wyer, R. S., Jr. (1980). Category accessibility and social perception: Some implications for the study of person memory and interpersonal judgments. *Journal of Personality and Social Psychology, 38,* 841–856.

Srull, T. K., & Wyer, R. S., Jr. (1989). Person memory and judgment. *Psychological Review, 96,* 58–83.

*Stapel, D. A., & Koomen, W. (1996). Differential consequences of trait inferences: A direct test of the trait-referent hypothesis. *European Journal of Social Psychology, 26,* 827–837.

*Stapel, D. A., & Koomen, W. (1997). Using primed exemplars during impression formation: Interpretation or comparison? *European Journal of Social Psychology, 27,* 357–367.

*Stapel, D. A., & Koomen, W. (1998). When stereotype activation results in (counter)stereotypical judgments: Priming stereo-

type-relevant traits and exemplars. *Journal of Experimental Social Psychology, 34,* 136–163.

Stapel, D. A., & Koomen, W. (2001). The impact of interpretation versus comparison mindsets on knowledge accessibility effects. *Journal of Experimental Social Psychology, 37,* 134–149.

*Stapel, D. A., Koomen, W., & van der Pligt, J. (1996). The referents of trait inferences: The impact of trait concepts versus actor-trait links on subsequent judgments. *Journal of Personality and Social Psychology, 70,* 437–450.

*Stapel, D. A., Koomen, W., & van der Pligt, J. (1997). Categories of category accessibility: The impact of trait concept versus exemplar priming on person judgments. *Journal of Experimental Social Psychology, 33,* 47–76.

*Stapel, D. A., Koomen, W., & Zeelenberg, M. (1998). The impact of accuracy motivation on interpretation, comparison, and correction processes: Accuracy × knowledge accessibility effects. *Journal of Personality and Social Psychology, 74*, 878–893.

*Stapel, D. A., & Schwarz, N. (1998). Similarities and differences between the impact of traits and expectancies: What matters is whether the target stimulus is ambiguous or mixed. *Journal of Experimental Social Psychology, 34,* 227–245.

*Strack, F., Schwarz, N., Bless, H., Kübler, A., & Wänke, M. (1993). Awareness of the influence as a determinant of assimilation versus contrast. *European Journal of Social Psychology, 23,* 53–62.

*Thompson, E. P., Roman, R. J., Moskowitz, G. B., Chaiken, S., & Bargh, J. A. (1994). Accuracy motivation attenuates covert priming: The systematic reprocessing of social information. *Journal of Personality and Social Psychology, 66,* 474–489.

*Wann, D. L., & Branscombe, N. R. (1990). Person perception when aggressive or nonaggressive sports are primed. *Aggressive Behavior, 16,* 27–32.

Weary, G., & Reich, D. A. (2001). Attributional effects of conflicting chronic and temporary outcome experience: A case of automatic comparison and contrast. *Personality and Social Psychology Bulletin, 27,* 562–574.

Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgment: The role of naive theories in corrections for perceived bias. *Journal of Personality and Social Psychology, 68,* 36–51.

Winter, L., & Uleman, J. S. (1984). When are social judgments made? Evidence for the spontaneousness of trait inferences. *Journal of Personality and Social Psychology, 47,* 237–252 (See correction in *Journal of Personality and Social Psychology* [1986], *50,* 355).

Wyer, R. S., Jr., & Carlston, D. E. (1979). *Social cognition, inference, and attribution.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Appendix A. *Table of Assimilation Effect Sizes*

Study	*N*	*d*
Abreu (1999)	60	0.1200
Banaji, Hardin, & Rothman (1993)	148	0.1495
Bargh, Bond, Lombardi, & Tota (1986)	219	0.3224
Bargh, Chen, & Burrows (1996)	34	0
*Bargh, Lombardi, & Higgins (1988)	115	–0.3514
Bargh & Pietromonaco (1982)	50	0.5305
Brotanek & Kayson (1996)	80	–0.0354
Carver, Ganellen, Froming, & Chambers (1983)	78	0.2657
Chen & Bargh (1997)	46	0.2400
Devine (1989)	78	0.3542
Erber, Caiola, Williams, & Prager (1997)	123	0.0662
Erdley & D'Agostino (1988)	45	0.6136
Fazio, Powell, & Herr (1983)	60	0.2753
Ford & Kruglanski (1995)	93	0.3758
Goncalves & Ivey (1987)	36	0.7591
Herr (1986)	100	0.1319
Herr, Sherman, & Fazio (1983)	40	0.4796
Higgins, Rholes, & Jones (1977)	60	0.5290
Ikegami (1993)	44	1.1316
Ikegami & Kawaguchi (1989)	80	0.8140
Kinicki, Hom, Trost, & Wade (1995)	159	0.0423
Levy (1996)	100	0.3964
Martin (1986)	60	1.1869
Martin, Seta, & Crelia (1990)	74	0.9766
Moskowitz & Roman (1992)	116	0.5187
Newman, Duff, Hedburg, & Blitstein (1996)	66.75	0.0523
Philippot, Schwarz, Carrera, De Vries, & Van Yperen (1991)	73	0.4455
Reeves & Garramone (1983)	49	0.4816
Schneider & Blankmeyer (1983)	96	0.4986
Sedikides (1990)	478	0.2032
Sinclair, Mark, & Shotland (1987)	88	0.1240
Skowronski, Carlston, & Isham (1993)	110	0.4789
Smith & Branscombe (1987)	162	0.0290
Smith & Branscombe (1988)	28	0.3963
Southwick, Steele, & Lindell (1986)	148	0.0830
*Srull & Wyer (1979)	80	5.6557
Srull & Wyer (1980)	96	0.1382
Stapel & Koomen (1996)	32.33	1.0464
Stapel & Koomen (1997)	108	0.2398
Stapel & Koomen (1998)	145	0.2432
Stapel, Koomen, & van der Pligt (1996)	174.6	0.6259
Stapel, Koomen, & van der Pligt (1997)	280.5	0.4207
Stapel, Koomen, & Zeelenberg (1998)	179.8	0.9393
Stapel & Schwarz (1998)	125	0.4724
Strack, Schwarz, Bless, Kübler, &Wänke (1993)	40	0.6187
Thompson, Roman, Moskowitz, Chaiken, & Bargh (1994)	244.5	0.3425
Wann & Branscombe (1990)	86	0.4940

*Studies that were identified as outliers and excluded from analyses.

Appendix B. *Table of Anchoring Effect Sizes.*

Study	*N*	*d*
Banaji, Hardin, & Rothman (1993)	151	–0.0598
Herr (1986)	100	–0.4461
Herr, Sherman, & Fazio (1983)	80	–0.1781
Philippot, Schwarz, Carrera, De Vries, & Van Yperen (1991)	73	–0.7359
Reeves & Garramone (1983)	83	–0.4531
Stapel & Koomen (1996)	32.33	–0.7918
Stapel & Koomen (1997)	36	–0.2668
Stapel & Koomen (1998)	88	–0.3444
Stapel, Koomen, & van der Pligt (1996)	287.3	–0.6470
Stapel, Koomen, & van der Pligt (1997)	117.5	–0.4238
Stapel, Koomen, & Zeelenberg (1998)	121.2	–1.2836

Appendix C. *Table of Correction Effect Sizes.*

Study	*N*	*d*
Ikegami (1993)	42	–0.7754
Martin (1986)	60	–0.7336
Martin, Seta, & Crelia (1990)	74	–0.6223
Moskowitz & Roman (1992)	116	–0.6622
Newman, Duff, Hedburg, & Blitstein (1996)	22.25	–0.1020
Stapel, Koomen, & Zeelenberg (1998)	264	–1.2704
Stapel & Schwarz (1998)	125	–0.3579
Strack, Schwarz, Bless, Kübler, & Wänke (1993)	41	–0.3908
Thompson, Roman, Moskowitz, Chaiken, & Bargh (1994)	125.5	–0.1754