

From P. Briñol and K. G. DeMarree (Eds.) (2012).  
Social Meta-cognition. New York: Psychology  
Press.

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## The Metacognition of Bias Regulation

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### INTRODUCTION

**P**eople want to be—or at least to believe that they are—accurate or otherwise appropriate in their perceptions of the social world. They want to form optimal impressions of people, buy products they will continue to like, and support political candidates or policies that they can defend to others. Yet, many personal and contextual factors can get in the way of forming the ideal opinion. Friends might pressure people to support certain views. Celebrities might advocate subpar products, or comparisons of target people or objects with contextual stimuli might create assimilation toward or contrast away from the contextual stimuli. How do people cope with these threats to forming accurate or otherwise reasonable opinions and perceptions?

There are many ways that people can try to remove or avoid bias. Though they represent a wide variety of specific processes, the methods of bias regulation we discuss are related in that they involve the potential for metacognition. That is, they likely include thoughts about one's thoughts or thought processes. Petty, Briñol, Tormala, and Wegener (2007) described six types of metacognitive thoughts (i.e., target, origin, valence, amount, evaluation, and confidence). The first four types of metacognitions parallel dimensions along which primary cognitions have been classified (see Cacioppo, Harkins, & Petty, 1981). That is, judges have coded whether the primary thoughts address one object or another (target); whether the thoughts are a person's own or repeat what the person has seen or heard from others (origin); whether the thought reflects something positive, negative, or neutral about the object (valence); and how many thoughts the person has about the object (amount).

Of course, people can also have their own perceptions about what the target of the thought might be, whether the thought is original to them, whether the thought reflects something positive or negative about the object, and about how many thoughts they have about the object. In addition, people can also have perceptions about whether it is desirable or undesirable to have a particular thought (evaluation) and can perceive a thought as having different levels of validity (confidence).

The different types of metacognitions can be correlated. For example, a thought whose origin is perceived as the self might be evaluated more favorably or held with more confidence than a thought attributed to an unknown other. In part because of these relations, many of the dimensions of metacognition might predict the likelihood of attempts to control bias. From the standpoint of theories of bias control (e.g., Strack, 1992; Wegener & Petty, 1997; Wilson & Brekke, 1994), however, the driving force in many attempts at bias control is perception of an influence as being unwanted, undesirable, or inappropriate. This seems closest to the metacognition of evaluation, where certain thoughts (those perceived as affected by a particular bias) are evaluated negatively.

Thoughts or perceptions might be viewed as unwanted or inappropriate for many (often metacognitive) reasons. Thoughts might be evaluated negatively if they are attributed to an unintended target, stem from an external source (not originating from the self), represent a valence that is not valued, are based on an insufficient (or otherwise unjustifiable) amount of thinking, or fail to produce an acceptable level of confidence. In a very general way, these reasons might be captured by saying that thoughts and thought processes are viewed as inappropriate or unwanted when they do not serve the perceiver's judgment goals (Wegener & Petty, 1997). Perhaps the most common judgment goal is to arrive at a "correct" or "accurate" view of the target (cf. Petty & Cacioppo, 1986). Of course, other goals and motivations are also possible, such as viewing oneself positively (e.g., Kunda, 1990; McCaslin, Petty, & Wegener, 2010), upholding procedural justice (e.g., Fleming, Wegener, & Petty, 1999), or avoiding prejudice (e.g., Fazio, Jackson, Dunton, & Williams, 1995; Plant & Devine, 1998).

## BIAS CORRECTION PROCESSES

Three types of bias regulation are discussed: *subtraction* of reactions to contextual stimuli, *theory-based correction*, and *suppression* of thoughts or reactions.

### *Subtraction of Reactions to Contexts*

Much of the early research on bias correction focused on *partialling* or *subtraction* of reactions that are viewed as responses to the context rather than to the target. Thus, these theories provide a crucial role for metacognitions concerning the target of the primary thought or reaction. For example, a person might think that a primary cognition (e.g., a positive thought such as "it makes me happy") is really about the context (e.g., weather) rather than the target (e.g., a politician). If so, the person might have the secondary cognition that it would not be appropriate to use the thought in judging the target. Or, even if the thought is believed to be about

the target, if people believe it was provoked by the good weather rather than the target, the person would presumably want to eliminate its influence on the judgment. This type of reasoning is central to many studies inspired by the set–reset model (Martin, Seta, & Crelia, 1990) and the inclusion–exclusion model (Schwarz & Bless, 1992).

Research examining the set–reset model often begins with blatant priming of responses consistent with one of two possible interpretations of an ambiguous target. When research participants are relatively unmotivated or unable to think carefully about the target, the overlap in reactions to the context and to the target is said to result in *setting*—a default treatment of reactions to both the target and context as if they were all reactions to the target. This creates assimilation to the blatant prime (Martin et al., 1990). However, when motivation and ability to think are sufficiently high, the set–reset approach suggests that social perceivers question whether their reactions are due to the context and will *reset* (i.e., partial out reactions attributed to the context). Social perceivers can be confused over which reactions belong to the context rather than the target. Thus, resetting can result in overcorrection when some real reactions to the target are mistakenly attributed to the context and are subtracted (partialled out). This overcorrection then takes the form of contrast (i.e., judgments of the target that are even less like the context than if the context were not present; Martin et al., 1990).<sup>1</sup>

Similarly to the set–reset approach, the inclusion–exclusion model has treated *inclusion* of information in one's representation of the target as the default mental operation and *exclusion* of the information as requiring greater cognitive effort (Schwarz & Bless, 1992). Research inspired by this model typically begins with a target that represents either a superordinate category (where a specific member can be included in or excluded from the category) or a subordinate member (or subset) of a category (where characteristics of the category can be ascribed to or excluded from the representation of the member).

In each case, inclusion leads to assimilation of the target to the context. This occurs when a target category (such as a social group) is assimilated to a contextual member of the group (e.g., Bodenhausen, Schwarz, Bless, & Wänke, 1995; Coats & Smith, 1999) or when a target person is assimilated to a contextual category membership (Fiske & Neuberg, 1990). Exclusion can reduce the assimilation (if the excluded information is subtracted from the target representation) or can lead to contrast (if oversubtraction occurs or if the excluded material is used as an extreme standard of comparison; Schwarz & Bless, 1992). The standard of comparison could directly influence perceptions of the target (Helson, 1964; Sherif & Hovland, 1961) or could redefine the response scale anchors (Ostrom & Upshaw, 1968).

Similarly to the set–reset approach, inclusion versus exclusion of information (and the primary reaction associated with that information) is determined, in part, by the secondary cognition of whether the information is appropriate for inclusion in the target representation. If the information is perceived as appropriate, it is included; if it is perceived as inappropriate, it is excluded. Information can be perceived as inappropriate (and be excluded) if it seems unrepresentative of the target (e.g., because of lack of context and target feature overlap; Herr, Sherman, & Fazio, 1983). Exclusion of reactions is also expected when participants realize

that previously encountered stimuli (e.g., primes) other than the target might have created the reactions (Strack, Schwarz, Bless, Kübler, & Wänke, 1993) or that conversational norms, such as norms against redundancy, suggest that use of the reactions is inappropriate (Schwarz, Strack, & Mai, 1991).

Attempts to partial or subtract perceptions could include a variety of metacognitive assessments (i.e., secondary cognitions). Social perceivers could identify the likely sources of thoughts and reactions and assess whether they are informative about the target as currently construed. In order to subtract the thought or reaction, there would likely have to be some cognitive mechanism for setting the thought aside and instead focusing on the thoughts and reactions to be included (e.g., tagging some thoughts as more valid or relevant for the judgment than others). One question of interest is how aware of these mechanisms people would be. The same types of assessments and outcomes could be accomplished by relatively simple cognitive processes that code whether a reaction to a target matches previous reactions to a context and disregards or gives lower weight to those reactions when judging the target.

In the subtraction research conducted thus far, direct measurements of metacognitive mechanisms have not been taken. Yet, a variety of measures might be possible. For example, in order to set aside a particular reaction, some type of monitoring of that reaction might have to take place (similar to the thought-suppression mechanisms discussed later or to those postulated by self-validation theory; Petty, Briñol, & Tormala, 2002). If so, then the thought or reaction to be set aside might become highly accessible in memory as the monitoring occurs and have an impact despite a labeling of incorrectness. Similarly, subtraction (partialling) studies have not directly measured perceptions of appropriateness of reactions or attributions of the reactions to the target or to the contextual stimuli (which should be proximal causes of resetting or exclusion in many settings). Therefore, although many of the judgment outcomes from this research are quite consistent with metacognitive mechanisms, future research incorporating more direct assessment of these metacognitions could help to assess how much explicit forms of metacognition come into play.

### *Theory-Based Correction*

Another view of the metacognitive activity involved in bias correction relies on people's perceptions of the biases at work (see Strack, 1992; Wegener, Dunn, & Tokusato, 2001; and Wegener & Petty, 1997, for comparisons of theory-based correction with the subtraction or partialling approaches). That is, beyond the primary cognitions (that may be relatively biased or accurate), there may also be secondary cognitions that represent perceptions of whether or to what extent the primary cognitions are biased (that may themselves be relatively accurate or inaccurate). Use of these perceptions of bias may also be determined by other secondary cognitions reflecting perceptions of whether the primary cognitions or their use is unwanted or inappropriate.

For some time, researchers have noted that people might realize the potential for bias and make efforts to overcome that bias (e.g., Higgins, Rholes, & Jones, 1977; Thompson, Fong, & Rosenhan, 1981; Wyer & Budesheim, 1987). Early on,

researchers attending to lay theories about biases focused on the inaccuracy of those theories and on the inadequate adjustments people made when using the theories (e.g., Nisbett & Wilson, 1977; Wilson & Brekke, 1994).

Despite the potential inaccuracy of lay beliefs about bias, however, social perceivers sometimes use such perceptions. In fact, the flexible correction model (FCM; Petty & Wegener, 1993; Wegener & Petty, 1995, 1997) is based on social perceivers' use of naïve theories of bias. FCM research has shown that people correct in different directions when they hold opposite theories of the direction of the bias (e.g., Wegener & Petty, 1995; Wegener, Petty, & Dunn, 1998). People correct for perceived biases even if there is no real bias (e.g., Petty, Wegener, & White, 1998; Wegener & Petty, 1995). Corrections for perceived rather than actual bias also mean that people sometimes correct primarily for one perceived bias (the most salient bias or the one for which clear beliefs exist), even if other biases are at work (Sczesny & Kühnen, 2004). Perhaps most interestingly, a correction for perceived bias can sometimes lead to creation of the opposite bias. For example, corrections for perceived negativity toward an unattractive or dislikable source can lead that source to be more persuasive than an attractive or likable source (Kang & Herr, 2006; Petty et al., 1998).

Research on theory-based correction addresses a broad set of domains, ranging from attribution (Gawronski, 2004) to impression formation (e.g., Lambert, Khan, Lickel, & Fricke, 1997; Wegener, Clark, & Petty, 2006) to persuasion (Kang & Herr, 2006, Petty et al., 1998) to courtroom judgments (Fleming et al., 1999), and a range of potential biases, including context effects (Petty & Wegener, 1993; Stapel, Martin, & Schwarz, 1998), mood and emotion (Ottati & Isbell, 1996), and stereotypes (Lepore & Brown, 2002). Recent work also demonstrates corrections for broad individual differences such as supposed tendencies to over- or underestimate (McCaslin et al., 2010).

Metacognitive activity is generally considered to be more likely when motivation and ability to think are high (Petty et al., 2007). Consistent with this idea, a number of studies of theory-based correction have manipulated or measured motivation or ability to think, and theory-based correction was more likely with high levels of thinking (e.g., DeSteno, Petty, Wegener, & Rucker, 2000; Isbell & Wyer, 1999; Ottati & Isbell, 1996; Petty, DeMarree, Briñol, Horcajo, & Strathman, 2008; Sczesny & Kühnen, 2004). This does not mean that theory-based correction would always require high levels of thinking, however. If particular biases are faced repeatedly and the same corrections become a commonplace occurrence, the corrections might become routine and less effortful (see Wegener & Petty, 1997; cf. Maddux, Barden, Brewer, & Petty, 2005). Also, some biases might be so salient or obvious that people might engage in a knee-jerk correction without much additional consideration of the target. Such corrections might play a role in the sleeper effect in persuasion (see Priester, Wegener, Petty, & Fabrigar, 1999, for discussion).

On a related note, the general nature of the bias might influence the likelihood of theory-based correction. For example, more thoughtful biases might seem more justified and less "biased" than less thoughtful biases. This could be because of the biased perceptions becoming more integrated with related knowledge and

because of the judgments seeming to provide an accurate reflection of the (thoroughly processed) available information. When this occurs, the person is likely to be less motivated to engage in correction and the bias would be harder to eradicate if correction is attempted (Petty & Wegener, 1993; Wegener et al., 2006; see also Schul & Burnstein, 1985). Taken together, then, we are suggesting that one can engage in different levels of elaboration of primary cognitions (e.g., producing biases that were formed in relatively thoughtful or nonthoughtful ways) and also of secondary cognitions (e.g., producing relatively thoughtful or nonthoughtful theory-based corrections).

Significant research supports the possibility of theory-based corrections, but much work remains to be done. For example, much of the research has identified perceptions of bias in one set of participants and corrections that are directionally consistent in another set of participants (e.g., Sczesny & Kühnen, 2004; Wegener et al., 1998). Future research should seek to provide more direct evidence of the links between individuals' perceptions of bias and their corrections when the potential for bias becomes salient (as in Wegener & Petty, 1995). Future research would also benefit from attempts to address the metacognitive mechanisms that might come into play when people identify potential biases. People might often use accessible or salient theories (beliefs) about bias to search for biases, but there could also be other cues to potential bias. For instance, noticing that one's perceptions of a target have changed might alert one that bias is possible, or noticing that there is a factor in the situation that matches the valence of one's current view might prompt one to consider whether that factor produced the reaction (see Wegener et al., 2001, for additional discussion).

### *Thought Suppression*

A third potential strategy for regulating bias is to try to keep the offending thought out of consciousness (i.e., to suppress it). An interesting aspect of suppression attempts is that they are often ineffective and have ironic consequences (such as later thinking more about the very thought one initially tried to suppress—a *rebound* effect; Wegner, Schneider, Carter, & White, 1987). Similar ironic effects of suppression attempts have been replicated in a wide variety of settings (see Wenzlaff & Wegner, 2000), including situations where suppression was spontaneous (not instructed by the experimenter; Macrae, Bodenhausen, & Milne, 1998). Similarly to other bias-regulation research, suppression has received particular attention in stereotyping (e.g., Macrae, Bodenhausen, Milne, & Jetten, 1994) and impression formation (e.g., Newman, Duff, Hedberg, & Blistein, 1996). In parallel with the previous bias regulation processes, the primary cognitions could be stereotype consistent or consistent with a primed concept; however, the secondary perception that the cognition is unwanted might lead to attempts to suppress the primary cognition.

Consistent with metacognition occurring more when motivation and ability to think are high, suppression attempts demand resources (Macrae, Bodenhausen, Milne, & Wheeler, 1996), and the instigation of suppression depends on motivation (Wyer, 2007). For example, after a specific stereotype is suppressed, judgments

are more consistent with a stereotype when later confronting a race-unspecified target (where motivation to keep suppressing should be minimal) than when facing a race-specified target from the same group (where motivation to suppress should remain; Wyer, Sherman, & Stroessner, 2000). Suppression is also influenced by practice. People who suppress more often can avoid the ironic effects of suppression even when capacity to think is depleted, which might reflect greater availability of replacement thoughts (Monteith, Spicer, & Tooman, 1998). More practiced individuals might also be less likely to have the unwanted thoughts come to mind in the first place (e.g., Fazio et al., 1995; Lepore & Brown, 1997).

Several accounts of suppression-based rebound effects have been offered. Wegner's (1994) theory of ironic processes in mental control has guided the majority of the research. According to this theory, two search processes are instigated with suppression attempts. An operating (controlled) process searches for internal (memory) and external (environmental) content that differs from the thought(s) one is trying to suppress. Also, an automatic monitoring process searches for failures in suppression (intrusions). This monitoring process is expected to activate conscious operating processes if the undesirable thought begins to intrude.

Because the monitoring process has to keep track of unwanted thoughts, it has to keep them with some level of activation, even if below the level of consciousness. This ironically leads the thoughts into a state of hyperaccessibility (Wegner & Erber, 1992), which may then result in its resurgence as soon as control operations are relaxed (Macrae et al., 1994) or cognitive resources are constrained. Hyperaccessibility can be even greater when there are environmental distractions during suppression because cognitive demands favor the monitoring process and simultaneously interfere with the conscious operating process (see Wegner & Wenzlaff, 1996). Macrae et al. (1994) demonstrated that rebound effects can occur even after a successful initial suppression with the relaxing of the motivation to suppress. In addition, these authors attributed the hyperaccessibility of suppressed thoughts to repetitive priming promoted by the monitoring process.

Förster and Liberman (2004) presented an alternative motivational explanation (see also Martin, Tesser, & McIntosh, 1993). Their motivational inference model assumes that specific metacognitive inferences about underlying motivation, drawn from difficulty in suppression, underlie postsuppression rebound. That is, failures during suppression, as well as the difficulty felt in it, lead to inferences of motivation to use the suppressed thought and consequently increase its "motivation-related accessibility." However, if the difficulty in suppression is not attributed to this motivational drive, rebound effects can be eliminated (Förster & Liberman, 2001).

Rebound effects have also been understood as a consequence of self-regulatory depletion (e.g., Gailliot, Plant, Butz, & Baumeister, 2007; Gordijn, Hindriks, Koomen, Dijksterhuis, & van Knippenberg, 2004). This explanation assumes that people have a limited resource for self-regulation and that suppression is depleting and dependent on the availability of self-regulatory resources. Gordijn et al. (2004) supported this view by showing that the initial suppression of one stereotype increased later use of a totally different stereotype. Thus, in this approach, rebound effects occur because the construct happens to be accessible at a time when regulatory resources have been depleted (by the previous suppression). If

other heuristics or simplifying knowledge structures are more applicable to the later activity, then their use would also be enhanced by the regulatory depletion associated with suppression.

A depletion-based explanation could also lead to an alternative account of rebound. That is, the felt depletion could be perceived as greater processing of information that could lead to a reduction in bias control strategies (Wan, Rucker, Tormala, & Clarkson, 2010). This type of attributional explanation also suggests that it might not be actual depletion at work, but rather perceptions of being depleted (Clarkson, Hirt, Jia, & Alexander, 2010).

## COMPARING THE TYPES OF BIAS REGULATION

Although subtraction, theory-based correction, and suppression represent independent streams of thought about bias regulation, it seems likely that attempts at bias regulation often involve elements of more than one of these. For example, Yzerbyt, Corneille, Dumont, and Hahn (2001) argued that correction of dispositional inferences, although traditionally associated with other forms of bias control, may also spontaneously involve suppression. It could also be that the proposed operating process in thought suppression might include subtraction of the unwanted thoughts or corrections of judgments or behaviors.

In some cases, one "intended" means of bias regulation might be replaced by another. For example, although there is a lot of evidence that attempts to suppress thoughts can make the thoughts subsequently more accessible, many studies of thought suppression allow for other types of correction in the "suppression" phases of the research. The same goes for postsuppression bias regulation. As described earlier, Wyer et al. (2000) showed that stereotype suppression resulted in application of stereotype-consistent concepts to a race-unspecified target, but not to a target from the stereotyped group. It could be that people resuppressed the primed concepts when encountering the later target from the stereotyped group.

However, it also seems plausible that participants with sufficient cognitive resources were either subtracting thoughts about the target that were attributed to the stereotype or were using a theory of stereotype-consistent biases to correct their judgments. When participants in the Wyer et al. (2000) research encountered the race-unspecified target, they might have been less likely to realize that their perceptions of the target could be biased by the earlier suppression episode, thereby allowing the bias to influence their ratings (see Monteith, Sherman, & Devine, 1998; Sczesny & Kühnen, 2004; Wegener & Petty, 1997).

In addition to suppression, subtraction, and theory-based correction potentially co-occurring (or one process operating instead of another), the processes could also be sequential. Perceptions of unsuccessful use of one process might lead social perceivers to try one of the other processes. For example, if attempting to suppress but having difficulty (lots of intrusions), the person might try to subtract reactions due to those intrusions or to correct for their perceived influence on judgments. Similarly, if a person is having trouble identifying particular thoughts to subtract, she or he might engage in an overall theory-based correction, or if the person has

no trustworthy theory of the direction or magnitude of a bias, the person might try to suppress thoughts that seem associated with the biasing factor.

Future research would do well to document more directly the role of each of the corrective metacognitions in influencing target judgments. Assessment of a wider variety of the processes in any one study would facilitate documentation of the possible co-occurrence or sequential implementation of the processes. This might also require some theoretical development to determine how, exactly, to measure some of the key constructs.

For instance, would subtraction (partialling) result in weaker cognitive relations between the target and thoughts/reactions that were subtracted from it? Or would attribution of some thoughts or reactions to a contextual stimulus primarily create closer cognitive associations between the contextual stimulus and those thoughts? Would direct measures of perceptions of reactions as coming from the target or context predict which reactions are subtracted from the target and which inform the target judgment? When a reaction is attributed to a context rather than a target, is the subtraction guided by or somehow combined with theory-based corrections (that might help to determine whether subtraction *per se* is necessary based on the type of bias the reaction would be expected to create)?

For example, a person might decide how many and what types of thoughts to subtract by consulting a naïve theory of bias. When people become concerned about biases, what determines whether they use subtraction, theory-based correction, suppression, or some combination? Research on such questions would help to create a more integrated view of correction-related metacognition.

### *Suppression and Correction*

A couple of studies have attempted to instigate suppression of the biasing variables or correction according to the perceived bias (Silva, Garcia-Marques, & Wegener, 2010; Yzerbyt et al., 2001). Yzerbyt et al. (2001) proposed that correcting for dispositional influences might spontaneously trigger suppression processes in addition to consideration of situational constraints. Suppression of dispositional inferences would open the door for subsequent rebound effects when participants confront another scenario allowing for dispositional inferences (see also Geeraert, Yzerbyt, Corneille, & Wigboldus, 2004).

Consistent with this assumption, Yzerbyt et al. (2001) found increased dispositional inferences about a subsequent speaker who freely expressed an opinion after previously encountering a speaker forced to express a similar opinion (compared with previously encountering a speaker who also freely expressed the opinion). Moreover, this effect was greater for participants who later reported trying harder to suppress dispositional inferences during the first video. This design assumes that the forced expression makes the expressed opinion seem biased, requiring correction or suppression of the dispositional inference.

In a subsequent study where suppression instructions were contrasted with instructions to “focus on the situation” surrounding the attitude expression continuously, rebound effects only occurred with suppression instructions. These results could suggest that spontaneous suppression of dispositional inferences led

to rebound. However, this study might not represent a pure comparison of suppression with correction because directing people to think about the situation might not result only in correction for perceived dispositional bias (just as instructing people to focus on arguments in a persuasive message might not lead them to correct primarily for perceived biases related to the message source).

In a persuasion setting, Silva et al. (2010) directly asked participants to control the biasing effects of an attractive/unattractive source of a persuasive message either by suppressing thoughts about the source or by correcting for the possible influence of the source's characteristics. Those asked to keep the source of the message out of consciousness were ironically more influenced by source attractiveness in a subsequent, ostensibly unrelated persuasive context. However, those instructed to attend to the source characteristics but to ensure that judgments were not influenced by them revealed no subsequent ironic consequences. Thus, suppression and (theory-based) correction seem to be conceptually distinct bias regulation strategies (because they can have different consequences, at least in some settings).

There is, however, room for different mechanisms to bring about ironic effects even without attempts to suppress. For example, inadvertent repetitive priming of the biasing variable might occur with subtraction or theory-based correction (Strack & Mussweiler, 2001). If so, then subsequent ironic effects (including hyperaccessibility) might occur (cf. Macrae et al., 1994). In addition, as noted by Monteith, Sherman, et al. (1998), if many of the studies previously described as involving "thought control processes" actually reflect "response control processes," then at least some rebound effects may have involved subtraction or theory-based correction.

Also, although at least some of the effects of correction or suppression are not dependent on depletion of mental resources (Geeraert & Yzerbyt, 2007), the self-regulation involved in subtraction or correction might sometimes be depleting enough to promote ironic effects. This might be especially likely when people are engaging in a novel correction or are facing a bias that is salient and difficult to overcome. Future research should investigate these possibilities and clarify whether nonsuppression processes can create ironic effects (and, if so, when).

### *Correction and Recomputation*

Though it has not received a great deal of direct attention in bias correction research, it would be ideal for a person to be able to "set aside" a bias and instead use available "unbiased" information to compute judgments (i.e., to *discount* certain pieces of information and use other pieces of information; Schwarz & Clore, 1983). Strack and Mussweiler (2001) conducted a series of studies to compare *adjustment* of responses (generally consistent with theory-based corrections) with what they called *recomputation* (i.e., setting aside biased information to base judgments on remaining information). These researchers provided research participants with stereotype-consistent individuating information so that recomputation would lead to more stereotypic judgments but adjustment (correction for the stereotype) would lead to less stereotypic judgments.

When participants received little individuating information (i.e., little "unbiased" information to use for judgments), an instruction asking people not to be

influenced by group membership led to less stereotypic ratings (consistent with theory-based correction or subtraction). However, when participants received a large amount of individuating information, the same instruction led to an increase rather than a decrease in stereotypic ratings (consistent with recomputation).

When sufficient individuating information is available, Dove, Wegener, and Petty (2001, 2003) argued that people would engage in recomputation when it seemed feasible, but would use theory-based correction when recomputation was difficult. They provided research participants with a list of job applicants in which graduates from the participants' own university had higher starting salaries than graduates of a rival university. When target information was re-presented after a correction instruction (not to be biased by university affiliation) but just prior to judgment, recomputation occurred (larger difference in salaries favoring participants' own university). However, when information was not available after the instruction to avoid bias, judgments reflected theory-based corrections (shifts away from favoring one's own university). In a second study, when participants received a conditional correction instruction (when asked to correct if they perceived anything biasing them; see Stapel et al., 1998), both the recomputation and theory-based correction patterns were more pronounced for people high in need for cognition (Cacioppo & Petty, 1982).

## ADDITIONAL CONCEPTUAL DISTINCTIONS

It should be clear that not all metacognition feeds into bias correction per se. For example, one can perceive a given thought as valid or invalid without perceiving bias in the thought or attempting to correct for a bias (as specified by the self-validation hypothesis; Petty et al., 2002). It is also important to note that not all bias regulation requires metacognition and that, on a related note, bias regulation can occur at different levels of elaboration. Therefore, one of the direct challenges for future research is to specify how, exactly, each means of bias control can be documented. For some types of bias correction, those means are reasonably apparent, but for others, such data are generally lacking.

### *Relations With Context Effect Theories*

Assessing when metacognitive judgmental correction has occurred is made all the more difficult by models that predict similar judgmental outcomes without referring to bias correction per se. Many studies of bias correction demonstrate a judgmental bias in one condition (e.g., assimilation to a context or impact on judgments by a message source) with less of that bias or even the opposite bias (i.e., contrast from a context or antisource reactions) in another condition. These results are consistent with corrections, but alternative models can produce similar results. For example, theories of assimilation and contrast suggest that contexts produce assimilation when perceivers attempt to interpret the qualities of the target or when they test a hypothesis that the target is similar to the context; however, the same contexts can produce contrast if the perceivers engage in comparisons between the context and target or test hypotheses that the context and target are different (e.g., Mussweiler & Damisch, 2008; Stapel & Koomen, 2001).

These theories, however, do not propose that the comparison or dissimilarity testing has anything to do with attempts to regulate context-induced biases. That is, contrast effects need not result from correction. Thus, in at least some settings, one must be cautious about interpreting judgment results alone as due to bias correction. Even in traditional bias control theories, some of the proposed mechanisms are clearly metacognitive, whereas others are not. For example, if extreme exemplars are excluded from a category and used as standards of comparison (Schwarz & Bless, 1992), this could occur with mechanisms that do not rely on attempts at bias correction per se.

### *Seeking Correctness and Avoiding Incorrectness (Bias)*

One way to compare bias control with other mental activities is to distinguish between seeking correctness and avoiding incorrectness. Wegener and Petty (2001) noted that this distinction captures differences between the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) and the FCM (Wegener & Petty, 1997). The ELM begins with social perceivers seeking correct assessments of targets, whereas the FCM begins with the goal of avoiding biases. According to Wegener and Petty (2001), when the issue of bias is not salient, the default orientation is for seeking correctness, but as the potential for bias becomes more salient, people become more oriented toward identifying and avoiding bias.

These two theoretical frameworks highlight some distinctions that are less salient in other theories. For example, the ELM includes both thoughtful and nonthoughtful processes focused on seeking correctness (such as scrutinizing the merits of the arguments in a persuasive message versus merely counting the number of arguments; Petty & Cacioppo, 1984). The outcomes of a more thoughtful correctness-seeking process can sometimes overcome or change the judgments that would have resulted from less thoughtful correctness-seeking processes; however, this need not reflect attempts to avoid bias associated with the nonthoughtful processes.

If, for example, perceivers believe that the thoughts coming from argument scrutiny are more valid, reliable, or relevant to the merit of the advocacy, they could receive greater weight in judgment than the thoughts coming from counting the number of arguments, which might be perceived as less valid, reliable, or relevant (Petty, 1994). Yet, a resulting decrease in use of the nonthoughtful (perceived as unreliable) output need not reflect perceptions of bias or attempts at bias correction (see also impression formation theories in which group membership can be processed as an attribute of the target; Fiske & Neuberg, 1990; cf. Brewer & Feinstein, 1999).

These distinctions may also be important for social psychological models that specify general “reflexive” or “impulsive” as opposed to more “reflective” modes of thinking (e.g., Lieberman, 2003; Pryor, Reeder, Yeadon, & Hesson-McInnis, 2004; Strack & Deutsch, 2004) or for similar dual-system views of judgment and decision making (e.g., Evans, 2006; Hammond, 1996; Stanovich, 1999). In these approaches, more deliberative, analytic, reflective processes are sometimes described as capable of “correcting” the output of less deliberative, more heuristic, impulsive processes. Yet, as in the ELM example, many such effects need not rely on bias correction per

se so much as they rely on validity-based metacognitions or other perceptions that one type of reaction is more reliable or "correct" than another.

This is not to say that perceptions of validity can play no role in bias correction. Surely there are times when people attempt to correct for "biases" that come from invalid or "incorrect" information. However, there should also be times when people are unlikely to use information perceived as invalid or to give such information reduced weight in judgments without any perception that the information would create biases that must be overcome. Thus, from the standpoint of bias regulation, it is important to specify how, exactly, one might document that a particular type of bias correction process is at work as opposed to alternative processes that might regulate judgment outcomes through different means.

### *Can Metacognitive Bias Regulation Be Automatic?*

We noted earlier that some bias regulation has been described as automatic (e.g., Glaser and Banaji, 1999; Maddux et al., 2005). We also noted that bias correction can become routine with practice, even if the correction started as a thoughtful, resource-intensive process (Wegener & Petty, 1997). But if thoughtful, metacognitive corrections become routine (perhaps to the point of becoming automatic), are they still metacognitive and are they still the same process?

This depends, in part, on one's definition of process (see Wegener & Carlston, 2005). The field has not really addressed whether an initially resource-intensive process that becomes more efficient (especially to the point of automaticity) is still the same process. If the same mental operations are performed, though in a speedy, less resource-intensive way, one might be inclined to characterize the process as the same. For example, when a desire to correct for prejudice initially occurs, people likely need to be vigilant of the sources and situations in which they might show bias and then effortfully correct their judgments in these settings (Devine & Monteith, 1999). With repeated practice, however, the assessment of possible bias and the correction for it could occur very quickly and out of conscious awareness (e.g., Maddux et al., 2005). Thus, from this standpoint, quick assessments of one's thoughts could be metacognitive even if those same assessments had previously taken more cognitive effort.

On the other hand, many markers of process differences (e.g., different moderators, different consequences) might be affected when once-thoughtful processes become more efficient. From this standpoint, it could be useful to view routinization of a thoughtful process as a separate process (with different moderators, different cognitive mechanisms for implementation, and possibly different consequences—for immediate or delayed thinking or behavior). For example, there might be situations in which more thoughtful corrections produce outcome judgments that resist change more than similar judgments produced by less thoughtful corrections. As in many circumstances, lack of difference in the judgment outcome can be rather uninformative regarding process sameness, but observed differences (e.g., in resistance of a judgment) can provide reasonable evidence of process differences (of at least quantitative differences in processes and often of qualitative differences as well; see Wegener & Carlston, 2005; Wegener & Claypool, 1999).

In the end, however, the important point may not be whether practiced (automatic) metacognition is or is not still called metacognition or considered a qualitatively different process. The important point is whether a particular perspective on metacognition and bias regulation does a good job of accounting for people's judgments and behaviors. Invariably, this calls for some "lumping" of similar processes together and some "splitting" of some processes from one another (see Petty, Wheeler, & Bizer, 1999). We look forward to research and theory on bias regulation that more directly addresses the similarities and differences among subtraction, theory-based correction, and suppression (as well as other related processes, such as recomputation). Such comparisons would also likely aid in determining whether less thoughtful (even automatic) efforts at bias regulation represent routinized versions of the prominent metacognitive corrections or different types of processes altogether.

## NOTE

1. Subtle and blatant primes have different effects. With a blatant prime, low levels of thinking tend to show the assimilation effect, whereas high levels of thinking enhance the likelihood of correction (see also DeSteno et al., 2000). However, more subtle primes can bias thoughts without being identified as biasing, so high levels of thinking lead to assimilation (see Petty et al., 2008).

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