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A motivational model of post-suppressional rebound

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A motivational inference model (MIMO) of post-suppressional rebound (PSR) is proposed, according to which the difficulty experienced during suppression and suppression failures is attributed to motivation to perform the suppressed activity and thereby enhances this motivation. Along with existing theories of motivation, we argue that as long as the motivation is active, related constructs remain accessible, and fulfilling this motivation inhibits the accessibility of such constructs. According to MIMO, PSR is the fulfilment of a need, induced by suppression, to do the suppressed activity. Two lines of research provide evidence for MIMO. First, we show that attribution of experienced difficulty of suppression to an external stimulus, which blocks the normal attribution of such difficulty to motivation to do the suppressed activity, eliminates PSR. Second, we show that expression after suppression acts as a means of fulfilment of the motivation induced by suppression and therefore reduces the accessibility of the suppressed construct. Novel predictions about PSR are derived from MIMO, and the model’s implications for theories of suppression, as well as for more general theories of cognition and motivation, are discussed.

In order to control thoughts and behaviours, people often try to suppress unwanted thoughts. Dieters may try to avoid thinking about fatty foods, a person in drug rehabilitation may try not to think of drugs, a student may attempt to concentrate on an exam and suppress thoughts of distracting objects, and a professor may try to suppress aggressive thoughts about a colleague he finds immoral and socially unacceptable. Yet, many times these attempts to suppress one’s thoughts not only fail but also produce the
opposite effect (Wegner, 1992, 1994; Wegner, Shortt, Blake, & Page, 1990). Wegner, Schneider, Carter, and White (1987) were the first to demonstrate both the fallibility of suppression and the existence of post-suppression rebound (PSR)—the tendency of the suppressed construct to become even more accessible than it would be without having attempted to suppress the construct. In the study by Wegner et al. (1987), participants were instructed to not think of white bears for a period of 5 minutes and to ring a bell each time the thought of a white bear crossed their minds. Following this initial suppression period, another 5-minute phase was introduced during which participants could think of anything they wanted, including white bears, and continued to ring a bell each time the thought of a white bear surfaced. This group was compared to another group of participants who performed the expression phase first, without initial suppression. The results showed that suppression in the first phase was difficult for the participants—most of them thought of white bears despite instructions not to think of them—and that thoughts of white bears rebounded after suppression in the second, free expression phase. In other words, the rate of white bear thoughts during the expression phase was higher in the suppression-first group than in the expression-first group.

Although this original study examined thoughts of white bears, a content of likely minor significance for people’s lives, replications using more relevant suppression topics quickly followed. Rebound after suppression was demonstrated with use of colour-words in describing paintings (Liberman & Förster, 2000), thoughts about a film showing a fire in an office building (Davies & Clark, 1998), thoughts about one’s own former romantic relationships (Wegner & Gold, 1995), and mood (Wegner, Erber, & Zanakos, 1993). It has also been shown that suppressing stereotype use enhanced the accessibility of the stereotype and produced more stereotypic judgements and more prejudiced behaviour (Förster & Liberman, 2001; Liberman & Förster, 2000; Macrae, Bodenhausen, & Milne, 1998; Macrae, Bodenhausen, Milne, & Jetten, 1994; Monteith, Spicer, & Tooman, 1998b; Wyer, Sherman, & Stroessner, 1998). Recently, we showed that suppressing aggressive thoughts leads to a resurgence of aggressive motives (Förster & Liberman, 2003).

In order to explain PSR, Wegner (1994) introduced the now classic ironic monitoring model of suppression (Wegner & Wenzlaff, 1996). According to this model, suppressing a thought or a response involves two processes: first, a controlled search for distractors (i.e., contents other than the one being suppressed) and second, automatic monitoring for suppression failures, or thoughts of the suppressed construct. The automatic monitor “reviews potentially conscious material, noting items that imply failed control and increasing their activation. This increases the likelihood that the items will surface in consciousness so that the operating process can renew its work”
(Wegner, 1994, p. 38). For example, when trying to suppress thoughts of white bears people try to think about other things (e.g., last vacation) and at the same time monitor for occurrences of thoughts of white bears. This monitoring process notes suppression failures (e.g., “I thought about how beautiful Yosemite Park was” and then, “Yosemite has bears. Oops! I should not have thought about Yosemite”) and directs thoughts to a new subject upon detecting a failure (e.g., “Let’s try to think of sweets instead. Gummy bears. Oops! Let me try my project on soccer robots”). Although this process successfully pushes thoughts of white bears out of consciousness, the ironic monitor remains sensitised to the construct of white bears through the entire period of suppression, and thereby makes it accessible. Consequently, when the suppression period is over, the accessibility of the suppressed construct is manifested in faster and more frequent use of it.

Thus, one reason for PSR is that the ironic monitor made the suppressed construct accessible through the act of thought suppression. Whereas ironic monitoring theory is not specific with respect to the question of how exactly accessibility is produced, Macrae and colleagues (1994) theorised that the ironic monitor produces semantic priming (for reviews see Higgins, 1996; Neely, 1991; Wyer & Srull, 1989). According to the logic of semantic priming, activation of a concept enhances its accessibility. Moreover, it has been shown that the extent of accessibility enhancement increases with the recency and frequency of priming. For example, priming a word several times has a stronger and more durable effect than priming it only once (Neely, 1991). Because the suppression phase is extended, and the ironic monitor operates during that entire period, relatively intense and lasting accessibility is produced. We refer to this type of accessibility as priming-related accessibility and wish to distinguish it from another type of accessibility, namely, motivation-related accessibility.

Recently, we (Liberman & Förster, 2000; Förster & Liberman, 2001) proposed that inferences about motivation and motivation-related accessibility underlie PSR. Our Motivational Inference Model of PSR (MIMO) is summarised in Figure 1. We suggest that people may infer from the difficulty they experience during suppression or from suppression failures that they are motivated to use the suppressed construct. For example, in Macrae et al.’s (1994) experiment participants were asked to write a story about a day in the life of a skinhead person presented on a photograph. Those participants could have found the task difficult and thought, “If it is so hard for me not to use stereotypes of skinheads, then it must be because I really want to use them”. We propose that this attribution of difficulty to motivation enhances the motivation to think of the suppressed construct, thereby also enhancing its accessibility.

According to MIMO, there are at least two theoretical conditions in which PSR would not ensue: The first is when neither difficulty nor
suppression failures are experienced during suppression, and the second when difficulty and/or suppression failures are experienced but are not attributed to motivation to use the suppressed construct. Furthermore, MIMO predicts that as long as difficulty of suppression is attributed to the motivation to use the suppressed construct, PSR would increase with higher levels of difficulty of suppression.

Some evidence in the literature on PSR is consistent with these predictions. For example, Kelly and Kahn (1994) found that suppression of frequently occurring intrusive thoughts, unlike suppression of novel thoughts provided by the experimenter, did not produce rebound effects. The ironic monitoring account argues that the strenuous process of suppression may become more efficient with practice, and thus requires fewer resources and shifts the balance away from the unwanted effects of automatic ironic monitoring (Monteith et al., 1998b; Wegner, 1994). MIMO, on the other hand, suggests that practice simply makes suppression
Another finding is that PSR is stronger when participants engage in suppression under cognitive load compared to no-load conditions (Wegner, 1992, 1994; Wegner et al., 1987). Ironic monitoring theory explains that cognitive load interferes with the controlled process of looking for distractors but not with the automatic process of ironic monitoring (e.g., Wegner, 1994). Another possibility, in line with MIMO, is that load makes suppression more difficult, and that people may interpret this difficulty as indicating a particularly strong motivation to engage in the suppressed activity. Interestingly, at the same time, MIMO suggests that if participants are led to attribute the experienced difficulty to an external factor (e.g., the extra task that produces load), then the effect of load on rebound would be undermined. Ironic monitoring theory, on the other hand, predicts the same effect of load on rebound regardless of the attribution participants make for the experienced difficulty. Obviously, further research is needed to examine this intriguing possibility.

In addition, there have been interesting findings of PSR with stereotypes. In one study, Monteith et al. (1998b) showed that PSR does not occur with people low in prejudice. They theorised that low-prejudice people possess an internal (as opposed to external) motivation to suppress stereotypes (Monteith, Sherman, & Devine, 1998a). Possibly, the inferences that normally activate the motivation to use the suppressed construct are weaker with intrinsically motivated suppression than with extrinsically motivated suppression. Furthermore, it may be that intrinsically motivated people (e.g., people who are convinced that they are not racist at all) are less inclined to interpret difficulty of suppression as a desire to use the suppressed construct (e.g., use racist elements in the story they write). Perhaps due to pre-existing beliefs, these people would find it easier to attribute difficulty to external sources rather than to motivation to do the suppressed activity.

An intriguing property of suppressed constructs, pointed out by Wegner and Smart (1997), is that when suppressed thoughts come to mind, they are experienced as being particularly true, genuine, and important. It has also been found that the emotions associated with a suppressed construct are intensified after suppression (Lane & Wegner, 1995; Wegner et al., 1990). Although not directly related to rebound, this phenomenon is worth considering within the framework of MIMO. We would suggest that importance and emotional intensity are inferred from suppression difficulty and failures in the same way as the motivation to use the suppressed construct is inferred from suppression difficulty. Quite simply, the enhanced emotional response may result from interpreting suppression failures as indicating the importance or the emotional intensity of the suppressed construct. Thus, a person might think that the suppressed thought keeps occurring despite attempts to suppress it because it is particularly intense or important, an inference that may, in itself, add a flair of mystery and depth.
to the suppressed thoughts. In fact, this type of inference is similar to the logic that underlies psychodynamic theory, according to which terrifying thoughts of tabooed contents find their way to consciousness if they are particularly intense. It could be that this psychoanalytic theory about how the mind works found its way into laypeople’s thoughts on the mind and affects the way people interpret failures to suppress. It seems worthwhile to examine PSR in cultures that are not widely familiar with the Freudian view of suppression failures. It could be that in such cultures suppression would not intensify emotional reactions to suppressed contents, and that PSR would be reduced. Another interesting hypothesis is that contents easily associated with the psychodynamic theory (aggression, sex, death) would be more susceptible to PSR and emotional intensification than more subdued contents. Let us now describe the Motivational Inference Model of PSR (MIMO) in more detail.

THE THEORETICAL ASSUMPTIONS OF THE MOTIVATIONAL INFERENCE MODEL OF POST SUPPRESSIONAL REBOUND

Our MIMO account rests on two theoretical assumptions: First, MIMO predicts that people infer from suppression difficulty and suppression failures a motivation to use the suppressed construct. Second it is assumed that the accessibility produced by such inferences is motivational in nature.

We now turn to an examination of these theoretical assumptions.

Inferences of motivation from experienced difficulty

Self-perception theory (Bem, 1972) and the overjustification framework (Nisbett & Valins, 1972; Pittman & Heller, 1987) introduced the idea that people engage in inferences about their own motivations. This research has shown that providing a salient, extrinsic reward for engaging in an attractive activity may undermine both intrinsic interest and subsequent engagement in that activity (Lepper, Greene, & Nisbett, 1973). Moreover, imposing an extrinsic restriction on an initially unattractive activity was shown to enhance subsequent intrinsic motivation to engage in it (Wilson & Lassiter, 1982). Presumably, both effects occur because people attribute their initial engagement in the activity (or their refraining from it) to the extrinsic causes and discount (or augment) their intrinsic motivation. In other words, people who think that they performed an activity for a reward conclude that they are not interested in the activity, and people who performed an activity despite a threat of being punished for it infer that the activity must be attractive. It is worth emphasising that an inferred motivation is real and its consequences for behaviour and other processes are indistinguishable from
any other motivation. According to self-perception theory, motivation may be inferred from overt behaviour. We propose that it can also be deduced from subjective experiences of difficulty.

That subjective difficulty may be used as informational input in self-relevant inferences has been repeatedly demonstrated by Norbert Schwarz and his cooperators (Belli, Winkielman, Read, Schwarz, & Lynn, 1998; Rothman & Schwartz, 1998; Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991; Wänke, Bless, & Biller, 1996; Wänke, Schwarz, & Bless, 1995; Winkielman, Schwarz, & Belli, 1998). In a typical study (Schwarz et al., 1991), participants are asked to remember either a small number or a large number of diagnostic behavioural incidents (e.g., either six or twelve incidents of assertive behaviour they performed) and then rate themselves on a relevant dimension (e.g., indicate how assertive they are). It is typically found that listing a large number of relevant incidents (which is relatively difficult) reduced ratings on the corresponding dimension. For example, people rated themselves as less assertive after listing twelve assertive behaviours than after listing six assertive behaviours, presumably because listing twelve behaviours was experienced as difficult, and people inferred from the experienced difficulty of retrieving assertive behaviours a lack of assertiveness on their part. In support of the proposed inferential mechanism, Schwarz and his colleagues (1991) have shown that the effect of difficulty of retrieval may be altered by a misattribution manipulation. Thus, when participants were led to believe that the music played in the experimental room inhibited recall, they did not reduce their self-ratings on assertiveness after recalling twelve incidents of assertive behaviour (as compared to recalling six such incidents). Presumably, in this case they attributed the difficulty of retrieval to an external source and did not think it was indicative of lack of assertiveness on their part.

We take from self-perception theory the notion that people may infer their own motivations, and from Schwarz’s “feelings as information” approach the notion that people use experienced difficulty (and not only overt behaviour) to infer their own dispositions. Combining these theories, we suggest that people may use experienced difficulty to infer their own motivations. Recently, we (Liberman & Förster, 2003) tested this notion in the context of decisions. Specifically, we suggested that perceived difficulty of making a decision might be attributed to the relative attractiveness of the alternatives and thus affect subsequent liking of and motivation to pursue the chosen and the rejected alternatives. We theorised that perceiving a decision as difficult, compared to perceiving it to be easy, would enhance the attractiveness of the rejected alternative and reduce the attractiveness of the chosen alternative. In other words, a difficulty in making a decision could reduce the spreading apart of alternatives (i.e., less enhancement of the chosen alternative and less derogation of the rejected objects).
We used a misattribution paradigm to test this prediction. In one of our studies participants in the first group were told that an external stimulus (e.g., an aromatic scent) would make a decision between two alternatives (e.g., two colours) difficult; participants in another group were told that the same external stimulus would make the decision easy. Those groups were then compared with a control group of participants who do not receive information connecting the external stimulus to either ease or difficulty. By the logic of misattribution, compared to the control group, the internal attribution of difficulty would be discounted in the first group and augmented in the second group. In the second stage, the same alternatives were rated or chosen again, and those second-stage ratings or choices comprise the dependent measures in our studies. We predicted and found that compared to the control condition, there was less spreading of alternatives in the augmented difficulty condition and more spreading of alternatives in the discounted difficulty condition. Presumably, participants inferred from their experienced difficulty of rejecting an alternative (e.g., a colour) that they wanted to use it, which, in turn, made them more likely to choose it on a later occasion. This result was replicated with different content domains and with a manipulation of actual difficulty (rather than attributions about difficulty), suggesting that people may use experienced difficulty of decision to make inferences about the relative attractiveness of the chosen and the rejected alternatives.

We think that a somewhat similar process underlies PSR. For example, in the studies by Wegner et al., participants experienced suppression failures or intrusions of the suppressed thought (e.g., Wegner & Gold, 1995; Wegner et al., 1987). Lacking the knowledge that most people experience a substantial number of such intrusions (i.e., that the task is objectively difficult), participants may think that the failures are informative of their own motivational state: “Thoughts of white bears keep popping into my mind despite my attempts to suppress them, and I seem to be incapable of avoiding these stupid thoughts. It seems, therefore, that I really need to finish at least these few white bear thoughts to get them off my mind.” This motivational state is best described as an itch, a momentary desire to do something. In those situations, the actor does not necessarily consider the action as important or consequential, but nevertheless feels the urge to proceed with the action. Such is the case, for example, with certain compulsions (e.g., when a person feels compelled to avoid stepping on the cracks of a pavement). Let us note also that in more natural social situations, as with suppression of stereotypes or tempting thoughts, this attribution is more plausible (“If it is so hard for me to suppress thoughts about food, then I must want to eat it”). Of course, in many situations people may be well aware of their motives before engaging in suppression (“I usually like thinking about food, and I like eating”), nevertheless
suppression could intensify these motivations in a specific situation ("Right now, I very much want to think about food and eat"). This process is reminiscent of the experiments that instructed kids not to play with an unattractive toy, which made them more likely to do so (Wilson & Lassiter, 1982).

Consider another example: in studies by Macrae et al. (1994) participants wrote a story about a day in the life of a skinhead person presented on a photograph and could have found the task to be hard. Being unaware of the fact that the task is difficult even without suppression, participants in the suppression condition could have attributed the difficulty to the need to suppress stereotypes. Thus, they could have reasoned: "It is hard to write this story, and everything I can think of is somehow, however remotely, related to the stereotype. It must be so difficult for me to write the story because I cannot use stereotypes. Without this restriction, it would have been much easier for me. It must be the case, then, that I really need to use stereotypes."¹ In this way, experienced difficulty is interpreted as a need to use the suppressed stereotype. As a result of these attributions, the need is created or intensified, and also enhances the accessibility of need-related constructs. Note that in this case, unlike in suppression of white bear thoughts, no overt suppression failures are necessary to give rise to an inference of a motivation. Rather, experienced difficulty serves as a basis of inference, just as in the studies by Schwarz et al. (1991).

In sum, we suggest that people infer from suppression failures and the perceived difficulty of the suppression process that they are compelled to think of the suppressed construct (i.e., a motivation to use the suppressed construct). This motivation, in turn, enhances the accessibility of need-related constructs (Bargh, 1997; Bargh & Barndollar, 1996; Bruner, 1957; Higgins & King, 1981) and thereby produces PSR.

Accessibility from motivation

The second theoretical assumption of MIMO is that because suppression produces or intensifies the motivation to use the suppressed construct, PSR is characterised by accessibility from a motivational source. What are the specific qualities of motivation-related accessibility?

Theories in cognitive, social, and motivational psychology propose that motivational states, such as needs, goals, intentions, and concerns, are characterised by enhanced accessibility of motivation-related constructs

¹It is reasonable to assume, as mentioned above, that some people may not have this inference. A person who is convinced that he or she is not racist may attribute the difficulty to the weird experimental situation or some other external and non-motivational cause (e.g., fatigue, lack of concentration, etc.).
(Anderson, 1983; Bruner, 1957; Gollwitzer, 1996; Gollwitzer & Moskowitz, 1996; Goschke & Kuhl, 1993; Higgins & King, 1981; Kuhl, 1983, 1987; Kuhl & Kazén-Saad, 1988; Wyer & Srull, 1986, 1989). It was also argued that an enhanced accessibility of motivation-related constructs is functional for goal attainment. (e.g., Bargh, 1997; Bargh & Barndollar, 1996; Gollwitzer, 1996; Gollwitzer & Moskowitz, 1996; Goschke & Kuhl, 1993; Kruglanski, 1996; Kuhl, 1983, 1987; Kuhl & Kazén-Saad, 1988; Liberman & Förster, in press). As noted before, we think that accessibility from motivational sources seems to have several characteristics that are distinct from priming-related accessibility (Liberman & Förster, in press). For research on thought suppression, two of them are highly relevant: persistence of accessibility until goal fulfilment and inhibition after goal fulfilment. Accessibility from motivation persists as long as the motivation is active and thus typically undergoes slower decay than priming-related accessibility. For example, Goschke and Kuhl (1993) made participants rehearse a series of actions and then informed them that they would either perform the actions (a goal) or observe another person performing them (no-goal). Using a recognition test, they found faster and more accurate responses to the actions in the goal condition than in the no-goal condition, even when rehearsal of the actions was not possible in the intervening time. In both groups, the stimuli were processed to a similar extent, and a similar duration of time elapsed between processing and the measurement of accessibility. Nevertheless, accessibility was higher in the goal group than in the no-goal group. These results were interpreted as supporting the notion of more persistent accessibility when motivation is involved compared to a non-motivational state.

Other evidence for the persistence of accessibility until goal fulfilment comes from research on frustrated goals. It was theorised that unfulfilled goals underlie rumination and intrusive thoughts (Martin & Tesser, 1996), and unresolved (i.e., current) concerns underlie occurrence of concepts related to these concerns in dreams (Klinger, 1977, 1987, 1996). Such activation remains until the individual reaches the original goal, reaches a substitute goal, or disengages from the goal altogether (Lewin, 1951; Martin & Tesser, 1996). Consequently, unfulfilled goals may maintain the accessibility of goal-related constructs over extended periods of months or even years.

Also relevant to MIMO is another principle of accessibility from motivational sources, which states that it is inhibited (i.e., actively reduced) upon fulfilment of the motivation (Marsh, Hicks, & Bink, 1998; Marsh, Hicks, & Bryan, 1999; Zeigarnik, 1927). Post-fulfilment inhibition is illustrated by the Zeigarnik effect, in which people remember interrupted tasks better than completed tasks (Zeigarnik, 1927; for reviews see Butterfield, 1964; Heckhausen, 1991; Wicklund & Gollwitzer, 1982). According to Lewin’s field theory (1951), the Zeigarnik effect occurs
because interruption preserved the goal to complete the task and kept the goal-related tension intact, whereas task completion released the tension and reduced memory of the task. Although Lewin and Zeigarnik did not formulate their findings in terms of accessibility, the free recall measure they applied could be interpreted in those terms (Tulving & Patterson, 1968). The Zeigarnik effect could suggest, then, that goals enhance the accessibility of goal-related constructs, and that goal fulfilment reduces this accessibility.

Marsh et al. (1998, 1999) extended the paradigm of Goschke and Kuhl (1993) mentioned above, and used a lexical decision task to examine the accessibility of intended actions both before and after completion. Replicating Goschke and Kuhl (1993), they found that prior to completion, accessibility of intended actions was enhanced relative to unintended (i.e., to-be observed) actions. More importantly, after performance, the accessibility of the completed action was inhibited and became lower than that of observed actions, a result that is suggestive of post-fulfilment inhibition.

Extending this research, we examined the principles of motivation-related accessibility in another paradigm (Förster, Liberman, & Higgins, 2003). In our experiments, participants searched through a series of pictures with the goal of finding a picture of glasses followed by a picture of scissors, at which time they were to report it to the experimenter. Participants in the control, no-goal condition looked through the same pictures without being instructed to find a target. Four blocks of pictures were presented, and the target combination was always in the third block. After each block of pictures, participants performed a lexical decision task, in which they indicated as fast and as accurately as they could whether or not a string of letters was a word. Faster lexical decision on semantic associates of a construct indicates a higher accessibility of it. Words related to glasses, words unrelated to glasses, and non-words were randomly presented. In this way, we examined the accessibility of goal-related and non-goal-related constructs, both before and after goal fulfilment, and compared those to the accessibility of the same constructs in a control, no-goal condition. We found that the accessibility of glasses-related words increased as a function of the distance from the goal (from block 1 to block 2, before the goal was fulfilled), and decreased after goal fulfilment (i.e., after block 3). Moreover, the decrease was evident both in relation to the pre-fulfilment stage and the control, no-goal condition.

We believe that the proposed principles of accessibility from motivational sources are consistent with a functional view of the interface between motivation and cognition because they are conducive to efficient self-regulation. Like many theories of motivation and volition, we believe that heightened accessibility of goal-related constructs helps detect stimuli that are instrumental for efficient goal pursuit in the environment and thus
contributes to the likelihood of goal achievement (see Ach, 1935; Gollwitzer, 1999; Kuhl, 1983). For example, while searching for something (e.g., glasses), it would be useful to activate concepts that are related to the target of search, such as its typical or likely locations (e.g., case, bag, bedroom) or typical activities for which the target is used (reading, watching TV) because the target of search is likely to be in proximity to the associated object or the activity (e.g., the glasses are likely to be near the TV). For that same reason, it is functional to retain a state of heightened activation until the goal is fulfilled.

Also in line with other theorists, we think that upon goal fulfilment, the accessibility of goal-related constructs loses its functionality and could potentially interfere with other tasks an individual faces. In cybernetic models of goal hierarchies (Carver & Scheier, 1999; Vallacher & Wegner, 1987), for example, goal attainment (e.g., buying groceries) is followed by the reinstatement of a higher-order, super-ordinate goal (e.g., cooking dinner) that constitutes the reason for pursuing the original (i.e., subordinated) goal. In this view, constructs related to the fulfilled goal (e.g., money, supermarket) are clearly irrelevant and could potentially interfere with successful performance of the next task at hand. “Clearing up” the mental system from such constructs could be highly instrumental (see also Gollwitzer, 1999; Kuhl, 1983; Mayr & Keele, 2000). In the example above, both “supermarket” and “cook” could be strong associates of “food”, and could potentially interfere with each other’s retrieval from long-term memory (Anderson & Spellman, 1995). Thus, inhibiting “supermarket” after successfully shopping could be instrumental for performing the next task, cooking.

We should note that only a clear sense of goal fulfilment should produce inhibition. Some types of goals (e.g., standards) are never fulfilled (albeit they may be instantiated) and therefore do not produce post-fulfilment inhibition. For example, the standard to be an egalitarian person is enacted but not fulfilled by admitting a minority candidate to one’s school. Because being egalitarian requires a person to continuously act in accordance with those standards, such behaviour (as admitting a minority) would not be followed with post-fulfilment inhibition (see also Liberman & Förster, in press).

We think that the notion of goal-related accessibility could shed new light on the process underlying PSR, as well as on potential methods to eliminate it. Specifically, MIMO suggests that participants infer a motivation to use the suppressed construct while they suppress it and that enhanced accessibility after suppression is related to motivation. Thus, MIMO predicts that the accessibility of the suppressed construct persists as long as the motivation is active and would be inhibited once the motivation is fulfilled (i.e., in the context of suppression, after participants do the
suppressed activity). Our model therefore predicts inhibition of motivation-related accessibility after goal fulfilment, whereas models based on the notion of priming-related accessibility predict an increase in accessibility after goal fulfilment, so long as it entails processing of goal-related concepts. To test this prediction, we conducted a series of experiments (Liberman & Förster, 2000), which are described in more detail in the following section.

EMPIRICAL EVIDENCE FOR THE MOTIVATIONAL INFERENCE MODEL OF POST SUPPRESSATIONAL REBOUND

We now turn to review the empirical evidence in support of MIMO. As with the theoretical background, we first examine evidence for the operation of the inferential process in producing PSR, and then turn to evidence supporting the notion that motivation-related accessibility underlies PSR.

Motivational inference and post-suppressional rebound

A series of studies examined the processes of motivational inference that underlie PSR ( Förster & Liberman, 2001). We reasoned that if inferences about the meaning of experienced difficulty mediate rebound, altering these inferences should affect the magnitude of the rebound.

Our first studies used Wegner’s white bear paradigm. Participants were introduced to an experiment on spontaneous thoughts and were required to verbalise their thoughts for 5 minutes while suppressing thoughts of white bears. They were also instructed to ring a bell whenever a thought of a white bear crossed their minds. In order to manipulate inferences about difficulty, we borrowed the successful misattribution paradigm from Yzerbyt, Schadron, Leyens, and Rocher (1994): during the suppression period, participants listened to a recording of unintelligible speech, which was an extract from a novel read aloud and played backwards. We told some participants that the tape would make it easy for them to suppress thoughts of white bears because it would subliminally introduce concepts that interfere with such thoughts. We told other participants that the tape would make it difficult for them to suppress thoughts of white bears because it would subliminally encourage those thoughts. We predicted that this manipulation would either augment or discount, respectively, attribution of difficulty to an internal cause, i.e., motivation (Heider, 1958; Kelly, 1972; see Olson & Ross, 1988; Ross & Olson, 1981 for an application of the discounting principle to self-perception). We therefore termed the conditions in our study augmented difficulty condition and discounted difficulty condition. We reasoned that for participants in the augmented difficulty
condition the inference process would be something like, “If it is difficult for me to suppress the thought in spite of the purported helpful effect of the tape, it must be because I am really compelled to think of white bears.” Participants in the discounted difficulty condition, on the other hand, would engage in an inference process along the following lines: “It is difficult for me to suppress the thoughts, but it must be the effect of the tape and not something special about me.” As in the original study by Wegner et al. (1987), in the second stage participants were instructed to think aloud with no restriction on the topic of their thoughts, and the number of white bear thoughts was counted. We also included a no-attribution group, in which no tape was played in the first phase, and a control group, in which no suppression was introduced in the first phase. We predicted that relative to the no-tape condition, there would be more rebound in the augmented difficulty condition and less in the discounted difficulty condition.

Let us first note that the number of suppression failures did not differ between the augmented difficulty and the discounted difficulty groups, and both were substantially higher than the no-tape group, presumably because the tape made suppression difficult, regardless of its purported effect on difficulty. More importantly and consistent with our main prediction, in the expression phase, participants in the discounted difficulty condition reported significantly fewer thoughts of white bears than participants in the augmented difficulty condition. In fact, telling participants that the tape would make suppression difficult not only reduced PSR but actually eliminated it (see Table 1). The number of white bear thoughts in the discounted difficulty group was lower than in the no-tape condition and did not differ from the control (no-suppression) condition. Telling participants that the tape would make suppression easy enhanced rebound as compared to the no-tape condition. Thus, the study demonstrated both reduction and

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<th>Discounted motivation</th>
<th>Expression</th>
<th>Augmented motivation</th>
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<td><strong>Suppression phase</strong></td>
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<tr>
<td>No tape</td>
<td>3.81&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.62&lt;sup&gt;b&lt;/sup&gt;</td>
<td>9.93&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td><strong>Expression phase</strong></td>
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<td>8.69&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.06&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.40&lt;sup&gt;b&lt;/sup&gt;</td>
<td>17.40&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Non-standardized regression coefficients (B) predicting rebound from suppression failures</td>
<td>.39&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-.28&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.35&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
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</table>

Within each phase, values that do not share a common superscript differ at $p < .05$. 

TABLE 1
Number of white bear thoughts and correlations between suppression failures and rebound (Study 2, Förster & Liberman, 2001)
enhancement of rebound relative to the baseline level of rebound obtained in
the no-tape condition.

We also examined the correlations between suppression failures (i.e., the
number of white bear thoughts during the suppression phase) and rebound
(the number of white bear thoughts during the expression phase). Notably,
in our study, participants were aware of their failure to suppress (because
they needed to report those) and probably wondered about their meaning. If
participants interpreted suppression failures as indicating either a high or
low motivation to use the suppressed construct, MIMO should predict a
higher correlation between the two measures in the high motivation
condition than in the low motivation condition. This is precisely what our
results showed. In addition, the correlations in the control condition were
closer to the high motivation condition than to the low motivation
condition, as would be expected if naturally (i.e., without specific
instructions) people interpret suppression failures as indicating a high
motivation to think about the suppressed construct.

In another study, we replicated these results with a more direct
manipulation of attribution, in which we explicitly told participants that
suppression failures either reflect high or low motivation. In particular, we
told participants in the high motivation condition that some people
experience occurrences of thoughts of white bears during suppression, that
such failures to suppress indicate a high motivation to think of white bears,
and that in general, difficulty in suppressing thoughts of a certain construct
indicates a high motivation to think about the construct. In the low
motivation condition we told participants that failures to suppress white
bears indicate a low motivation to think of white bears, and that in general,
people who want to think about something and are required to suppress
thoughts of this construct develop strategies that make suppression easy.
Participants in the control condition did not receive any instructions relating
suppression difficulty to motivation.

We found that providing participants with the theory that suppression is
indicative of a low motivation to engage in the suppressed activity reduced
PSR, while providing participants with the opposite theory did not affect
PSR. The results of this study are important because it directly manipulated
attributions of suppression failures as indicative of a high versus low
motivation to use the suppressed construct. Moreover, the fact that
suggesting such an attribution did not enhance rebound is consistent with
the notion that such attributions are naturally applied.

Rebound after suppression of stereotypes is especially troubling. It means
that sometimes, the best of our intentions to be egalitarian and accepting of
members of prejudiced groups backfire and cause the opposite to occur. In
the domain of stereotypes, more than in any other field, ways to eliminate
PSR would be extremely helpful. It would be particularly useful if it were
possible to implement these means to reduce PSR in real-life situations and not only with experimental procedures that are confined to the lab. Clearly, our reverse-played tape recording is not the ideal candidate for such a manipulation. Therefore, we sought out another way to reduce PSR by changing the attributions. In three studies we asked German participants to suppress stereotypes about foreign workers. Members of this social group suffer in Germany from a negative stereotype, mostly associated with crime.

The first task in all three studies ( Förster & Liberman, 2001, Studies 3a, 3b, 3c; see Table 2) was to write a story about a typical day in the life of “Mr. X, a married 45-year-old foreign worker, who lives in Cologne and has a car”. Participants in the no-suppression condition received no further instructions. Participants in the suppression conditions were instructed to avoid using stereotypes in their story. Participants in the “suppression difficult” condition were told, in addition, that recent research has shown that avoiding stereotype use is difficult, even for people who are not prejudiced. They were told that it is only natural and does not mean one is prejudiced. We hypothesised that participants in this condition would not attribute the difficulty they experience during suppression to their motivation to use the stereotype and would therefore not exhibit PSR. After writing the story for 5 minutes participants were stopped and escorted to another room, where they proceeded with other, seemingly unrelated studies.

The dependent measures were different in each of the three studies. In our first study, we used word-stem completion tasks with stems that could be completed with both crime-related words and neutral words. We felt this would serve as a direct and cognitive measure of accessibility—we simply counted the number of stems completed with crime-related words. Second,
we assessed recommended penalties for crimes associated with foreign workers. We conceptualised the severity of the suggested penalties as a measure of stereotype accessibility. Third, we assessed the interpretation of an ambiguous cartoon, which could be perceived as a criminal act or as a neutral event, and conceptualised interpreting the cartoon as a criminal act as an indicator of stereotype accessibility. Thus, the latter two measures were more social measures of accessibility, in that they involved judgements about situations and people based on accessible knowledge (see, for example, Devine, 1989).

The stories participants wrote were more stereotypic in the control, no-suppression group than in the two suppression groups, which did not differ from each other (only in one study were there slightly fewer stereotypic stories in the suppression difficult condition, $M = 1.79$, than in the suppression only condition, $M = 2.38$, $p > .05$). Thus, it was not the case that telling participants that a difficulty in suppression is normative, relaxed suppression attempts and legitimised stereotyping.

The results with PSR supported our predictions. In all three studies, PSR was obtained in the suppression condition and eliminated in the suppression-difficult condition: compared to the control group, in the suppression group participants used more crime-related words to solve the stems, they demanded higher penalties, and they were more likely to interpret the ambiguous behaviour as a crime after suppression. Most importantly and consistent with our hypothesis, in all the experiments, PSR was eliminated in the group that was told that suppression is difficult for everybody. In that group, PSR did not differ from the control, free-expression condition. It appears that in all three studies, providing an external attribution for the difficulty in suppression eliminated PSR.

It is interesting to examine the implications of our model for the consequences of attempts to suppress aggressive thoughts. On the basis of PSR one would predict that suppression would lead to excessive aggressive thoughts and/or actions. We predict, in addition, that PSR of aggressive thoughts may be eliminated if suppression difficulty is attributed to an external cause (Förster & Liberman, 2003). Recently, we demonstrated precisely this effect. In the first stage of the experiment, participants took the perspective of a protagonist, who watches her lover making love with her best friend. After having read the story, participants were asked to write down what they had in mind. Participants in the no-suppression group did not receive any further instructions. Participants in the suppression group were asked to suppress aggressive thoughts. Participants in the difficult suppression group were told, in addition, that it is usually difficult for everybody to suppress aggressive thoughts in this type of situation. Accessibility of aggression-related constructs was measured after the suppression phase with a lexical decision task, in which words related to
aggression, words unrelated to aggression, and non-words appeared on a computer screen while participants had to decide as quickly as possible if the stimulus was a word or a non-word. Our results indicated that first, consistent with PSR, higher accessibility of aggression-related words was found in the suppression group compared to the control group. Most importantly, and as predicted by MIMO, PSR was eliminated when participants were told that suppression is usually difficult.

We interpret these results as evidence for the proposed inference mechanism: when suppression difficulty is not attributed to motivation to think of the suppressed construct, PSR is eliminated. Interestingly, such inferences also seem to affect behavioural rebound: In our aggression study we also included a more behavioural aggression measure, namely, a picture selection task. After the lexical decision task, participants were asked to select 10 pictures out of 30 for another person, whom they did not know. The 30 photographs were taken from the International Affective Picture System (IAPS) (Center for the Study of Emotion and Attention, 1995), a database of pictures that have been extensively pretested with respect to their valence (e.g., Ito, Cacioppo, & Lang, 1998; Lang, Bradley, & Cuthbert, 1990). The sample for our present study was taken from Mussweiler and Förster (2000), who demonstrated that selecting pictures with a negative valence from this sample reliably reflects aggression. Of the 30 pictures 10 were highly negative (e.g., a rotting animal corpse), 10 were neutral (e.g., a hairdryer), and 10 were highly positive (e.g., a puppy). Like Mussweiler and Förster (2000), we thought that aggression would be reflected in selecting more negative pictures to be seen by the other participant. Selecting the pictures is, in this context, an interpersonal action with clear pleasant or unpleasant consequences, which justifies treating it as a behavioural measure of aggression. Consistent with the predictions of MIMO, participants who suppressed aggressive thoughts showed a behavioural rebound—they chose more negative pictures than participants who did not engage in suppression. Importantly, those who suppressed aggressive thoughts but were informed that suppression is difficult did not show rebound—they selected fewer negative pictures than the suppression group and about the same number of negative pictures as the control group.

Behavioural rebound was also examined in one our studies reported above on helping behaviour. In that study (Förster & Liberman, 2001; see Table 2, row 4), we offered participants an opportunity to donate the chocolate bar they received for participation to a foreign worker’s children asylum centre. We used refusing to donate the chocolate as a measure of prejudiced (non-helping) behaviour, and reasoned that an accessible stereotype of foreign workers would make participants more reluctant to donate the chocolate to children of foreign workers. We predicted that
helping members of the stereotyped group would decrease after suppression relative to no-suppression, but would be restored to the no-suppression rate in the suppression-difficult condition. This was what we found: participants were less willing to donate the chocolate bar after suppression. However, when they were told that suppression is difficult for everybody, all participants made the donation.

An interesting class of behaviours pertains to basic needs, such as hunger or thirst. A recent study examined the effect of attribution of suppression difficulty on drinking (Rosenman, Liberman, & Förster, 2003). Participants watched a Coke commercial and were then asked to verbalise their thoughts about it for 5 minutes, either with no special instructions (in the control group) or with the instruction not to think of thirst and drinking in the suppression group. Participants in the discounted difficulty condition were told, in addition to the suppression instructions, that suppression of such thoughts after watching the commercial was found to be difficult. At a second, allegedly unrelated phase of the study, while participants filled out unrelated questionnaires, we offered them a variety of cold beverages. The amount of drinking served as the dependent measure. We found that suppressing thoughts of thirst and drinking enhanced drinking relative to the control group, producing the PSR. We also found that PSR was eliminated in the discounted difficulty condition, in which the amount of drinking did not differ from the control group.

To sum up, our studies found that augmenting internal attributions of suppression difficulty (by telling participants that an unintelligible recording played during suppression would make suppression easy) enhanced rebound, whereas discounting internal attributions for suppression difficulty (by telling participants that the recording would make suppression difficult) eliminated PSR. Furthermore, suggesting that suppression failures indicate a low motivation to think of the suppressed construct eliminated rebound, whereas suggesting that such failures indicate a high motivation to think of the suppressed construct preserved rebound. Moreover, we found that telling participants that suppressing stereotypes of foreign workers is difficult even for non-prejudiced people eliminated PSR of that stereotype. A recent study found similar effects for the suppression of aggressive or violent thoughts and behaviours as well as for the suppression of thoughts about thirst. Thus, PSR is eliminated when people do not attribute suppression failures and suppression difficulty to their motivation to use the suppressed construct. We think that the studies support MIMO in showing that inferences about motivation affect PSR. Let us now turn to the second main assumption of MIMO, namely, that motivation-related accessibility, rather than priming-related accessibility, underlies PSR.
Need-related accessibility and post-suppressional rebound

As noted before, MIMO predicts that expression after suppression reduces PSR. This prediction is based on the theoretical assumption that suppression induces or increases the need to perform the suppressed activity (thereby also increasing the accessibility of motivation-related constructs), and that by expressing a construct after suppression the need is fulfilled and thereby causes inhibition of motivation-related constructs. This is akin to the idea of reactance and catharsis: forbidding an action fuels the need to perform it and performing it fulfils the need, leading to reduced desire to perform it.

We tested this prediction in five studies (Liberman & Förster, 2000), in which participants either suppressed a construct or did not suppress it and then, in the second stage, either expressed the same construct or did not express it. Three studies examined suppression of colour words in describing a colourful painting; two others examined suppression of stereotypes. In all five studies, accessibility of the relevant construct following the two phases was the dependent variable. We expected first to replicate PSR, showing that when no expression is introduced, accessibility would be higher after suppression than after no suppression. Second, we predicted a classic priming effect for participants who did not suppress thoughts but only used them. The critical prediction concerned the way these two effects would combine. Specifically, if suppression produces accessibility by inducing a need to express the forbidden construct, then expression after suppression should satisfy that need and instigate inhibition of motivation-related constructs. Therefore, it would result in lower accessibility than either suppression alone (a state in which an active need continues to exist) or expression alone (a state in which accessibility due to construct use exists). In other words, we predicted that expression after suppression would eliminate PSR.

In three studies participants were asked to describe an abstract, colourful Miró painting so that another person would be able to imagine the picture without actually seeing it. Participants in the no-suppression condition received no further instructions, while participants in the suppression condition were told to avoid using any colour words or words related to colour. After this first stage, half of the participants in each condition, assigned to the expression condition, were asked to describe an abstract and colourful Kandinsky painting, again so that another person would be able to imagine the picture without seeing it. They were told to describe the picture by using colours. The rest of the participants, assigned to the no-expression condition, did not describe a second picture and proceeded directly with the next stage, in which accessibility was measured. After
completing the picture descriptions, all the participants were introduced to a seemingly unrelated task, which was actually designed to measure the accessibility of colour words.

For a measure of accessibility, one of the studies included a word-stem completion task with stems that could either be solved with colours or with words not related to colours. The results showed that both suppressing and using colour words enhanced their accessibility, demonstrating PSR and priming, respectively. More importantly and as predicted, despite the fact that expressing colour words obviously involved their processing, it reduced their accessibility when it followed suppression (see Table 3, row 1).

This study was closely replicated in another one that also measured the experienced difficulty of writing the picture description and the motivation to use colour words (see Table 3, row 2). As a measure of motivation, after completing the colour accessibility measure, participants indicated how much they would want to use colour words if they had to describe another picture. The results showed that motivation to use colours was higher in the suppression, no-expression condition than in the other three conditions, which did not significantly differ from each other. These results are consistent with our prediction that suppression would enhance the motivation to use colour words, and that introducing expression after suppression would then reduce it.

As a measure of difficulty, participants explicitly indicated how difficult it was to describe the last picture and how difficult it might be for another person to imagine the picture based on the last description they wrote (these measures were highly correlated and were averaged into a single difficulty index). Results showed that both suppression and no-suppression were evaluated as fairly difficult (7.52 and 6.67 on a 0–10 scale, 10 being the most

<table>
<thead>
<tr>
<th>Suppression expression</th>
<th>No expression</th>
<th>No suppression expression</th>
<th>No expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of colour-word solutions in a word-stem completion task (out of 6; Study 2)</td>
<td>2.44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.31&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>3.59&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Number of colour-word solutions in a word-stem completion task (out of 6; Study 5)</td>
<td>1.65&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.09&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.05&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Mean trait ratings of hostility (How hostile was the person?) On a 9-point scale ranging from 1(not at all) to 9(极度); (Study 4)</td>
<td>5.77&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.62&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.31&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Number of stereotypically female traits in a free trait generation task (out of 3; Study 3)</td>
<td>0.40&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.07&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.00&lt;sup&gt;b,c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Within each phase, means that do not share a common superscript differ at p < .05.
difficult). Apparently, describing the abstract painting so that another person would recognise it without seeing it was a difficult task, whether or not one could use colour words. Notably, MIMO does not predict that suppression would necessarily be more difficult than no-suppression; it only predicts that difficulty would be interpreted differently in both cases. Thus, even more central for our model were the relations between perceived difficulty, motivation, and accessibility of colour words in the suppression, no-expression condition. In this condition, difficulty had a significant effect on accessibility of colour words. That is, consistent with MIMO, the more difficult a person experienced the suppression task to be, the more accessible the suppressed construct was. Most importantly, and also consistent with MIMO, a mediational analysis (Kenny, Kashy, & Bolger, 1998) showed that motivation mediated the effect of difficulty on the accessibility of colour words in the suppression, no-expression condition (see Figure 2). Thus, when participants had to describe the abstract picture without using colour words, they experienced difficulty and interpreted it as indicating a motivation to use colour words. As a result, the motivation to use and the accessibility of colour words was enhanced.

Two additional studies examined our hypothesis about the effect of expression after suppression with suppression of stereotypes. One study examined the stereotype of African-Americans in the US (Liberman & Förster, 2000), which includes, among other traits, hostility (see Table 3, row 3). In the first phase, participants received a portrait of a smiling young African-American man (the task was borrowed from Macrae et al., 1994,

![Diagram](attachment://diagram.png)

**Figure 2.** Relations between motivation, difficulty, and accessibility of colour words in the suppression, no expression condition (Liberman & Förster, 2000; Study 5). *p < .01.
Participants in the no-suppression condition were simply asked to write a story about a day in the life of this person. Participants in the suppression condition were instructed, in addition, to not use the stereotype of African-Americans in their stories. Only participants in the expression condition were asked to write a second story. They were shown a second photograph of another young African-American man and instructed, again, to write a story about a day in the life of that person. This time, they were instructed to assume a perspective of a racist person and write the story by using stereotypes of African-Americans. We thought that expression would fulfill the goal of using racist stereotypes, which were presumably activated or enhanced during suppression. When used in the absence of prior suppression, however, it would serve as a prime and make the stereotype highly accessible. After both phases, all the participants proceeded to an ostensibly unrelated study in which they were asked to read a story about Donald and form an impression about him. Donald’s actions were ambiguous and could be interpreted as either hostile or assertive (Srull & Wyer, 1979). Participants rated Donald’s hostility among other trait dimensions. We reasoned, similar to other researchers in social cognition and in the field of automatic stereotyping, that higher accessibility of the African-American stereotype should produce higher hostility ratings of Donald (Devine, 1989).

The results revealed that the hostility ratings in the baseline, no-suppression, no-expression condition were lower than both the suppression alone condition and the expression alone condition, demonstrating PSR and the knowledge activation effect, respectively. Consistent with MIMO, when expression followed suppression, hostility ratings dropped to the level of the baseline (i.e., they were lower both relative to the suppression alone condition and relative to the expression alone condition). Accordingly, introducing expression after suppression reduced rebound, consistent with the idea that rebound stems from a need to express the suppressed construct, a need that may be fulfilled by expression.

In another study (Table 3, row 4), we replicated the same results with the stereotype of women (Liberman & Förster, 2000). Again, participants were asked to describe a picture of a scene involving two women under suppression or no-suppression instructions. Some participants were then assigned to the expression groups and received a second picture to describe and expression instructions (i.e., take the perspective of a sexist writer). After that, participants proceeded with an unrelated task on people’s conceptions about traits, in which they were asked to type three trait terms into the computer as quickly as they could. The traits were rated by judges on their degree of femininity. The results showed that relative to the no-suppression, no-expression baseline, accessibility of the female stereotype, as indicated in the femininity of trait concepts, was enhanced by both
suppression alone, producing PSR, and expression alone, producing the knowledge activation effect. Most importantly, when expression followed suppression, accessibility of the stereotype was reduced relative to both the suppression alone condition, and the expression alone condition. Thus, in both of our stereotyping studies, just as with the colour-suppression studies, introducing expression after suppression eliminated PSR, an effect that is consistent with the possibility that the accessibility produced by suppression stems from a need to use the suppressed construct suggested by MIMO.2

To summarise, our experiments provide evidence for the idea that suppression produces motivation-related accessibility. We think that this motivation is produced or enhanced by attributing the difficulty experienced during suppression or suppression failures to a motivation to perform the suppressed activity.

Two empirical ways to reduce rebound logically follow from MIMO: first, PSR should be reduced if suppression difficulty is attributed to an external source, and second, PSR should be reduced if expression is introduced after suppression. The two lines of research presented here empirically tested and confirmed both of these effects.

IMPLICATIONS

In the following section, we want to discuss briefly how other models of PSR might explain our results. Afterwards, we turn to examine some implications and extensions.

Alternative theories

First and foremost, the data produced in our experiments are inconsistent with models that assume PSR derives from priming-related accessibility (Macrae et al., 1994). This is because priming-related accessibility is known to be additive (Wyer & Srull, 1989), which means that two sources of

2One might ask why the expression only group did not fulfil the goal to express (e.g., express colours), which would, in turn, lead to inhibition (e.g., of colour-related words). Note that the participants in this condition were instructed to describe the picture so that another person would be able to imagine it, and this was their goal. They were also told to use colours, but that was not framed as the goal of what they were to do, but rather as a means towards describing the picture. That is, our instructions were “Describe the picture by using colours” rather than “Use colours by describing the picture” (see Liberman, Sagristano, & Trope, 2002; Liberman & Trope, 1998) for an analysis of goal subordination). Likewise, in our studies on suppression and expression of stereotypes, the goal was stated as writing about a day in the life of a person or describing a scene. Assuming a perspective of a prejudiced individual was not framed as the goal of what they were to do, but rather as a means towards achieving this goal (that is, we said “Write a story by using stereotypes” and not “Use stereotypes by writing this story”).
accessibility should add up and produce higher levels of accessibility than each of the sources separately. Because expression after suppression involves additional use of the suppressed construct, such theories should then predict that it would further increase its accessibility. Our results (Liberman & Förster, 2000) however, show the reverse pattern. Thus; and as reasoned above, and elsewhere (Förster & Liberman, 2001; Liberman & Förster, 2000), the ironic monitoring account cannot explain our findings. Moreover, ironic monitoring is also silent with respect to inferential mechanisms that we demonstrated in our studies.

The data are also incompatible with a model by Martin, Tesser, and McIntosh (1993, see also Martin & Tesser, 1996; Martin, Tesser, & Cornell, 1996), who suggested that PSR may occur because people experience thought intrusions as suppression failures and think of the goal of suppression as being incomplete. The authors argued that an incomplete task makes task-related constructs highly accessible. Consistent with this hypothesis, Martin et al. (1993) have shown that giving success feedback after suppression by telling participants that they had a relatively small number of thought intrusions, reduced rebound relative to a no-feedback condition. Note that whereas Martin et al. assume the goal of suppression, we assume a need to use the suppressed construct. It seems that Martin et al.’s (1993) theory is silent on the issue of the effect of expression after suppression on rebound, because it is not clear whether expression should further frustrate the goal to suppress or deactivate it by making it irrelevant. In some of our studies (Liberman & Förster, 2000) participants suppressed colours almost perfectly, and thus Martin et al.’s (1993) theory cannot explain why rebound occurred in these studies. Also, the model says nothing with respect to our findings regarding the effects of difficulty attributions on PSR.

Our results are also inconsistent with reactance theory (Brehm, 1966), according to which restrictions and regulations threaten one’s freedom of action and thereby elicit a reactance response—an unpleasant state of arousal followed by an urge to reaffirm one’s freedom by breaking the restrictive rules. According to reactance theory, PSR would be explained as a reaction to the restrictions introduced by suppression (see also Wegner et al., 1987). Within reactance theory, expression after suppression would eliminate rebound because it would restore the personal freedom undermined during suppression. However, reactance theory assumes that the motivation stems from the need to reduce the unpleasant arousal introduced by the suppression instructions, whereas MIMO assumes that motivation is inferred from suppression difficulty and failures. Our studies on motivational inference (Förster & Liberman, 2001) provide clear evidence for the operation of inferential processes—they demonstrated that altering people’s attributions about why they experience a difficulty in suppression may both
enhance and reduce rebound. These results support our inferential explanation rather than the arousal-reduction reactance explanation.

Implications and extensions of MIMO
The idea of reducing PSR by expression has some interesting implications for the suppression of actions, since recent research has shown that suppressing actions, in addition to thought suppression, produces PSR. For example, participants who were instructed not to move a hand-held pendulum in a particular direction became likely to do so, especially when cognitive load was introduced (Wegner, Anfield, & Pilloff, 1998). Ironic monitoring explains these effects by assuming that suppression of actions requires suppression of thoughts, which in turn activates the suppressed thought. It further suggests that when thoughts of an action become accessible, performance of that action is more likely (Anfield, Wegner, & Bowser, 1996; Wegner & Smart, 1997). However, suppression of thoughts is not necessary to suppress actions (i.e., one can think extensively about cheating in an exam and at the same time refrain from doing so), and an accessible thought does not always entail a corresponding action. Thus, a model that does not rest on these assumptions seems more appropriate. We think, therefore, that action suppression may be re-examined from a different, motivational perspective, such as the principle of overjustification. Of particular relevance are studies by Wilson and Lassiter (1982), who examined how instructions not to participate in an activity affected subsequent engagement in it. Specifically, they instructed children not to play with an unattractive plastic motorcycle that was available among five other toys. Two weeks later, these children played more with the motorcycle compared to children who did not receive any special instructions in the first session (Wilson & Lassiter, 1982, Experiment 1). They also showed that explicit instructions not to cheat on a test increased cheating on another test taken 8 to 20 days later (Wilson & Lassiter, 1982, Experiment 2). The authors interpreted their results within the framework of the overjustification principle (Nisbett & Valins, 1972; Pittman & Heller, 1987), suggesting that not engaging in the forbidden activity in the first stage was attributed to the explicit instructions, and therefore intrinsic motivation to engage in that same activity was augmented. Note that instructions to avoid a behaviour are similar to suppression instructions and increased likelihood of the forbidden action is similar to PSR. Importantly, in these studies rebound occurred 8 to 20 days after suppression, whereas accessibility of thoughts activated by constructs is known to decay much faster (Higgins, 1996; Wyer & Srull, 1989). It is unlikely, therefore, that accessibility from construct use accounts for these results. Rather, as suggested by Wilson and Lassiter (1982), it seems that the restrictive instructions led people to believe that
they wanted to perform the forbidden activity. This interpretation is consistent with MIMO.

A topic of particular importance that has occupied a central place in the social psychological literature is the suppression of aggression. It has been extensively discussed whether performing or viewing aggressive actions enhances subsequent aggression or reduces it by providing catharsis (Anderson & Bushman, 2002; Geen & Quanty, 1977). Recent literature, it seems, tends to suggest that the former is truer than the latter (see Bushman & Baumeister, 1998). As noted before, MIMO incorporates an idea similar to catharsis, in which fulfilling a goal reduces the corresponding motivation. We predict, therefore, that fulfilling an aggressive goal would reduce not only subsequent aggression, but also the accessibility of the aggressive construct, at least in the short run. However, we do not predict catharsis following generalised aggressive acts that are not goal-driven or goal-targeted, such as aggressive sports, violent computer games, or watching aggressive behaviour on TV. Nor do we predict a decrease in the aggressive drive, which, by definition, differs from an aggressive goal by being generalised and not having a clear sense of fulfilment. Only if the aggressive act fulfils a goal should that post-fulfilment inhibition of aggressive intentions be expected. We should also note that it could very well be that in the long run, post-fulfilment inhibition of aggressive reactions does not lead to general reduction of aggression, because the aggressive act makes aggressive means available in memory and habituates aggression. We are currently pursuing this line of research.

CONCLUDING REMARKS

Our aim was to introduce MIMO, a motivational inference model of PSR. Our review suggests that MIMO successfully accounts for existing findings in the domain of thought suppression and, in addition, predicts novel important phenomena in the field. Of course, effects that are associated with the suppression of thoughts can be caused by multiple mechanisms, including inferences of motivation, ironic monitoring, and reactance. Further research is necessary to show how all these mechanisms interact. Importantly, MIMO not only explains how PSR occurs, but also provides a number of ways to eliminate it. This is particularly important with unwanted cases of PSR, such as rebound of stereotypes or rebound of aggression, that may often follow genuine attempts to suppress those unwanted responses. We hope that the methods we propose may be applied in real-life situations to help people better control their own reactions such as when they control their aggressive or prejudiced behaviour, or attempt to diet. Our empirical findings so far make us optimistic that comparable means could also be applied outside the laboratory.
REFERENCES


