From Seeing to Being:
Subliminal Social Comparisons Affect Implicit and Explicit Self-Evaluations

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The authors hypothesize that social comparisons can have automatic influences on self-perceptions. This was tested by determining whether subliminal exposure to comparison information influences implicit and explicit self-evaluation. Study 1 showed that subliminal exposure to social comparison information increased the accessibility of the self. Study 2 revealed that subliminal exposure to social comparison information resulted in a contrast effect on explicit self-evaluation. Study 3 showed that subliminal exposure to social comparison information affects self-evaluations more easily than it affects mood or evaluations of other people. Studies 4 and 5 replicated these self-evaluation effects and extended them to implicit measures. Study 6 showed that automatic comparisons are responsive to a person's perceptual needs, such that they only occur when people are uncertain about themselves. Implications for theories of social cognition, judgment, and comparison are discussed.

Knowledge of self provides information that is necessary for navigating, controlling, and responding to the social world. Because it is reasonable and common to assume that the psychological processes that are important are typically fast and frugal (Logan, 1988; Stapel, 2003), it is reasonable to expect people to incorporate a rich array of social information into their working self-concepts automatically (Bargh, 1989).

One important source of self-knowledge comes from other people. Our self-concepts are shaped by what we hear, think, and know about other people. One of the basic mechanisms by which this occurs is social comparison (Festinger, 1954): We maintain a sense of who we are by comparing our own abilities, attributes, and attitudes to those of other people. Given that social comparisons are likely to occur frequently in a person's daily life, it is important that the social comparison process be automated. After all, social comparison can be of little benefit to individuals if it is too much of a burden for their limited mental resources. Thus, just as other psychological processes that are carried out repeatedly tend to become automated, social comparison is likely to be a process that can influence the views of the self spontaneously and with little conscious attention or monitoring.

The notion that social comparison can be automated suggests that the boundary conditions for the instigation of social comparison processes will be fewer than is often thought (cf. Gilbert, Giesler, & Morris, 1995). Specifically, if social comparison is indeed an automated process, then incidental exposure to a target person could be sufficient to influence self-evaluation. In this article, we investigate this proposal by testing the hypothesis that incidental, subliminal exposure to comparison targets can affect implicit as well as explicit self-evaluations. That is, we test the hypothesis that social comparison effects can appear automatically by investigating whether these effects can occur spontaneously (i.e., without intention) and unconsciously (i.e., outside of awareness).

Thus, in a way similar to the well-known *spontaneous trait inference* argument in the person perception literature that people spontaneously encode behavioral episodes (e.g., a boy helps an elderly lady cross the street) in terms of the implied trait concept ("helpful"; see Uleman, Newman, & Moskowitz, 1996), we suggest that people can also make spontaneous self-inferences on exposure to relevant comparison targets. That is, we propose that people may spontaneously infer self-evaluations ("I am not very intelligent") on the mere perception of a meaningful comparison standard (e.g., Albert Einstein), such that seeing automatically implies being.

Telltales of Automaticity: Unconscious and Spontaneous

The most suggestive demonstration that social comparisons may be automatic comes from a set of studies by Gilbert et al. (1995). Their findings challenged prevailing views regarding personal control over social comparison. Prior research and theories had suggested that people choose not to compare with dissimilar others (e.g., Festinger, 1954; Goethals & Darley, 1977; Gruder, 1971; L. Wheeler et al., 1969; Wood, 1989). As a common illustration, one would not expect a female amateur tennis player to compare her court game with the vastly superior game of a male tennis profes-

sional. The tennis professional is different from the woman on so many dimensions as to make him a mostly meaningless standard of comparison. The tendency to refrain from such comparisons would seem to suggest that the act of comparing with others is subject to volitional control—that is, that people only "seek" comparisons with similar others. Gilbert et al. found evidence, however, that people do not have this degree of control. Their study showed that participants' self-evaluations were influenced by exposure to dissimilar others if they first were made cognitively busy. This finding suggests that comparisons arise regardless of similarity and that it is only through effortful correction that dissimilar others do not alter self-evaluations.

These studies clearly demonstrate that social comparisons have one hallmark of automaticity: efficiency. That is, Gilbert et al. (1995) showed that social comparisons require few cognitive resources to arise (and that resources often must be exerted to prevent social comparisons from occurring). However, these studies did not address two other core components of automaticity (see Bargh, 1989). First, they did not demonstrate that comparisons can occur when a perceiver is *unconscious* of the comparison information, meaning that this information is presented outside of a perceiver's awareness. Second, they did not demonstrate that comparisons can be *spontaneous*, meaning that they can occur without a perceiver's intention to evaluate the self. To date, neither aspect of social comparison has received critical attention in the social comparison domain. We review each in turn.

Unconscious Comparisons

The suggestion that comparisons can be unconscious has not been addressed in any published study of social comparison. This is for the simple reason that, to date, researchers have only presented comparison information *supraliminally*. Gilbert et al. (1995) are no exception to this rule. Their participants received feedback about their performance on an ability-based test (i.e., "you scored 10 out of 18") and then received unambiguous information about either the performance of an upward comparison target (i.e., "she scored 16 out of 18") or a downward comparison target (i.e., "she scored 4 out of 18"). With this procedure, it not only seems likely that participants consciously reflected on the target of comparison, it also seems likely that they explicitly evaluated her in terms of her standing on the comparison dimension. This possibility seems only more likely given other features of the study. Participants were not just told how the target had performed but also how she should be evaluated (e.g., this individual is "particularly good" or "particularly bad" at the task). Often, researchers do not leave even this detail to chance and give participants explicit instructions to evaluate targets on the comparison dimension (e.g., "Please judge this person on the following dimensions," see Stapel & Koomen, 2000). Other times, researchers have been less explicit but have used instruction sets that are likely to activate impression formation goals (e.g., "Please read this person description, later you will be asked some questions about this material" or "We are interested in attractiveness and personality," see Mussweiler & Bodenhausen, 2002).

To prevent both conscious awareness of comparison information and the activation of intentional impression formation goals, it is necessary to present social comparison information *subliminally*. With subliminal presentation, social comparisons can occur with-

out participants being aware that comparisons have been made and without participants being cued to form impressions of others. As far as we can determine, research has yet to study social comparison under these conditions. Of course, there is ample evidence suggesting that person information can be perceived without awareness. For example, subliminally presented emotion faces can activate emotions (e.g., Murphy & Zajonc, 1993; Stapel, Koomen, & Ruys, 2002), subliminally presented category labels or exemplars can activate category stereotypes (e.g., Devine, 1989), and subliminally activated attitude objects can activate attitudes (see Fazio, 2001). No studies have shown, however, that subliminally presented comparison others can activate specific self-evaluations.

The relative lack of attention to subliminal effects on self-evaluation seems interesting to us, given that one might expect subliminal stimuli to exert greater influence on evaluations of self than other. Many researchers have argued that the self is an especially well-developed and often-used construct that dominates phenomenal experience (Ross & Nisbett, 1991; Storms, 1973) that is chronically accessed during social judgments (Cantor & Kihlstrom, 1987; Markus, 1977) and helps organize all manner of social perceptions (G. T. Greenwald & Pratkanis, 1984; Klein & Kihlstrom, 1986). As such, subliminal exposure to person stimuli may influence evaluations of the self more strongly than evaluations of others. This prediction runs contrary to some portrayals of social comparison, however, as researchers at times have argued that social comparison effects only occur when other people are consciously evaluated and judged (e.g., Dijksterhuis, Spears, et al., 1998; Gilbert et al., 1995; Parducci & Wedell, 1990). Thus, although there is a theoretical basis for predicting that self-evaluations will be especially sensitive to subliminal influences, such effects currently are unknown and, according to some, unlikely. We thus examine this issue by determining whether subliminally presented person information can influence evaluations of the self and whether these effects occur more readily than subliminal effects on evaluations of others.

Spontaneous Comparisons

Research also has not yet determined whether social comparison information can have unintended influences on the self. This is because studies that have looked at the effects of comparison on the self have relied on explicit measures of self-evaluation. By definition, explicit measures make the act of evaluating intentional. Other features of social comparison studies might make people especially interested in evaluating the self. In particular, researchers often design their studies to (implicitly or explicitly) suggest a competition between the participant and the target of comparison. This was true in Gilbert et al. (1995), for instance, where participants were led to believe that their abilities and those of the confederate were being assessed. In such competitive situations, where the goal is to outperform another person, individuals will be motivated to monitor and evaluate their own performance and ability levels in comparison to their competitors (see Carver & Scheier, 1998).

To assess whether the effects of social comparison on the self may be activated spontaneously, one needs to measure self-evaluation in a manner that is free of intentional responding. In other words, studies would need to measure self-evaluation *implicitly*. This has not been done, though several studies are sug-

gestive. The most direct evidence comes from research by Muss-
weiler and Bodenhausen (2002). They showed that supraliminal
exposure to similar (in-group) targets of comparison caused acti-
vation of self-knowledge (see also Dunning & Hayes, 1996). For
instance, they found that participants who were asked to form
impressions of targets were quicker to answer questions about
themselves if the target was an in-group member. These findings
suggest, at the least, that social comparison to in-group members
causes the self to become accessible. However, it is unclear from
this work whether this only occurs when the comparison other is
very similar to the self. Furthermore, this work does not demon-
strate that individuals take the next step and spontaneously
self-evaluate.

The most compelling evidence that people make spontaneous
self-evaluations comes from research showing that social compar-
ison information can influence proxy measures of self-evaluation,
such as attitudes, mood, behavior, or perceived relevance of the
comparison (e.g., Baldwin, Carrell, & Lopez, 1990; Dijksterhuis,
Spears, et al., 1998; Tesser, Millar, & Moore, 1988). Such studies
indicate that changes may occur even when people do not delib-
erately reflect on the self. Even these results are suggestive at best,
however. It is possible that changes on such measures are not
driven by changes in self-evaluations. In fact, several recent stud-
ies have shown that proxy measures of self-evaluation (such as
attitudes, mood, and behavior) belie effects on self-evaluation that
differ in both strength and direction (see Johnson & Stapel, 2003;
Stapel & Koomen, 2000; Stapel & Suls, in press).

In summary, there is evidence that social comparison does have
spontaneous influences on evaluations of the self, but the current
state of evidence is indirect. Moreover, no studies have addressed
this issue in the context of unconscious comparisons. The current
studies therefore test whether subliminally presented social com-
parison information can influence implicit evaluations of the self.

Summary and Research Overview

The view we are advancing is, quite simply, that seeing auto-
matically implies being. In light of this, we predicted that sublim-
inal exposure to social comparison information would lead to
spontaneous changes in self-evaluations. We tested this perspec-
tive in a series of experiments. Study 1 tested whether subliminal
exposure to comparison information activates self-representations.
Studies 2A, 2B, and 2C tested whether subliminal exposure to
comparison others that vary on certain dimensions (i.e., young vs.
elderly; unattractive vs. attractive; unintelligent vs. intelligent)
influences explicit self-evaluation on these same dimensions.
Study 3 tested whether subliminally presented social comparison
information would have stronger effects on self-evaluations than
other evaluations and whether they could affect mood assessments.
Studies 4 and 5 sought replication of these automatic social com-
parison effects on implicit measures. More important, these studies
tested for self-evaluative effects of comparison using two different
implicit measures. Finally, Study 6 crossed a subliminal person-
priming manipulation with a self-certainty manipulation. This was
done to determine whether automatic social comparisons are en-
gaged in response to epistemic needs.

Study 1

If social comparisons can unconsciously and spontaneously
affect self-views, then at the very least, comparisons that occur
outside of awareness should be associated with increased self-
activation. This prediction follows from Mussweiler and Boden-
hausen (2002), but our focus is specifically on the influence of
subliminal targets of comparison. We therefore tested the hypoth-
esis that self-activation would be stronger when person informa-
tion (picture of a neutral face) has been primed subliminally than
when nonperson information (picture of a tree) has been primed.
Differences in self-activation were indexed by responses to a
laboratory task developed by Davis and Brock (1978) to capture
this construct (see also Stapel & Tesser, 2001).

Method

Participants and design. Participants ($n = 30$) were male and female
undergraduates who participated in exchange for partial course credit. The
participants were randomly assigned to one of the experimental conditions.
The study had a single-factor (prime: person vs. tree) between-subjects
design.

Procedure. On arrival, participants were shown into one of eight
cubicles in the experimental room and seated in front of a computer. They
were told that they would participate in a series of unrelated studies. First,
participants performed a parafoveal vigilance task (modeled after Stapel et
al., 2002) in which the priming stimuli were presented outside of aware-
ness. Participants were told that very short flashes would appear on the
screen in unpredictable places and at unpredictable times and that their task
was to decide as quickly and accurately as possible whether the flash
appeared on the left or right side of the screen. After having completed the
vigilance task, participants completed a task designed to measure self-
activation. Next, participants received a funnel debriefing procedure, in
which they were probed for awareness of the priming stimuli, awareness of
the influence of the priming task on later judgments, and general suspicion
concerning the goal of the study (see Stapel et al., 2002). Finally, partic-
ipants were thanked and debriefed.

Materials and dependent measure. Priming stimuli were a (black-and-
white) photograph of a male face with a neutral expression (pretested by
Stapel et al. [2002] on a 7-point *sad–happy* rating dimension, $M = 3.98$)
and a photograph of a tree (also pretested to be neutral, $M = 4.01$).

Self-activation was measured as follows: We told participants that
earlier research had shown that while reading a foreign language, people
were sometimes able to guess the correct translation of pronouns. Partic-
ipants would be presented with a short story in Wezwe, a language spoken
only in New Guinea. Then, participants were given a short story in a
nonexistent language in which 20 pronouns were underlined. Participants
were asked to guess the correct translation of each of the 20 pronouns. Our
main interest was the number of first-person pronouns (*I, me, my*) partic-
ipants would list. Earlier research has shown that heightened self-activation
or self-focus led participants to list relatively more first-person pronouns
(e.g., Stapel & Tesser, 2001).

Priming procedure. The priming task was modeled after Stapel et al.'s
(2002) parafoveal priming task. Once participants were seated in front of
their computer, the experimenter explained the vigilance task, first verbally
and then with instructions on the computer screen. Participants were seated
so that the distance between their eyes and the computer screen was 100 cm
when they sat erect on the chair as they were instructed to do. This ensured
that the priming stimuli were presented outside of participants' perceptual
field (for details, see Stapel et al., 2002). The experimenter instructed
participants to place their index fingers on the two labeled keys of the
keyboard and to press the left key, labeled "L," if a flash appeared on the
left side of the screen and the right key, labeled "R," if a flash appeared on

the right side of the screen. A fixation point consisting of one X was presented continually in the center of the screen. The experimenter emphasized that because of the unpredictable timing and location of the flashes, the best way to detect all of them quickly would be to keep their eyes on the fixation point at all times. Participants were given 10 (neutral priming) practice trials to become familiar with the procedure and to ensure that they understood it. After answering any questions, the experimenter began the 60 experimental trials of the vigilance task, which took participants approximately 10 min to complete.

All pictures presented on the computer screen were 20 mm in size. The pictures that were flashed in the 10 practice trials and in 40 of the experimental trials were pictures of Chinese characters. In the remaining 20 experimental trials, either the person picture or the tree picture was flashed. The order in which pictures were flashed was random. All pictures were flashed for 110 ms. In all conditions, these pictures were immediately followed by a 120-ms mask (for details see Stapel et al., 2002).

Awareness and suspicion. Previous suboptimal priming studies have shown that the paradigm used here provides sufficient safeguards to prevent participants from becoming aware of the priming stimuli (see Stapel et al., 2002). However, to ensure that participants were not aware of the priming stimuli, we used an extensive funnel debriefing procedure in which participants were asked increasingly specific questions about the study (see Stapel et al., 2002). This procedure revealed that all participants reported that they had seen flashes. Although some reported to have seen "pictures," no participant could report on the general or specific contents of the primes. Furthermore, participants' guesses of which of the two pictures they had seen did not exceed chance, nor did they differ between conditions (see Stapel et al., 2002). Finally, there were no participants who thought the vigilance and translation tasks were related. Thus, we could safely conclude that we were successful in presenting our priming stimuli outside of awareness and in not alerting participants to the actual relation between the vigilance and translation tasks. In all the studies reported in this article, we used the same subliminal paradigm and the same funnel debriefing procedure. Because in all these studies, the debriefing procedure showed that participants were not aware of the primes or thought there was a relation between the different tasks, we do not report these findings in the remaining studies.

Results and Discussion

Because there were no (main or interaction) effects of participants' gender on any of the measures in any of the studies reported here ($Fs < 1$), we collapsed analyses across gender.

Participants who were primed subliminally with a person face listed more first-person pronouns ($M = 6.87$) than did those who were primed with a tree ($M = 5.60$), $F(1, 28) = 4.47, p < .05$. Thus, cognitive activation of self-knowledge is indeed stronger when person information instead of nonperson information has been primed subliminally. These results are in line with our hypothesis that subliminal exposure to comparison information is sufficient to spontaneously influence judgments related to the self. However, our hypothesis goes further than this. We not only argue that subliminal exposure can *activate* the self but that it can influence *evaluations* of the self. In Studies 2A, 2B, and 2C, we put this hypothesis to a first test. Specifically, we subliminally exposed them to pictures of people who should prime young versus elderly comparison standards (Study 2A), unattractive versus attractive comparison standards (Study 2B), or intelligent versus unintelligent comparison standards (Study 2C). We then measured the influence of these primes on explicit self-evaluations.

Studies 2A, 2B, and 2C

These studies examined the hypothesis that subliminal exposure to relevant comparison information affects explicit self-evaluations. Previous research investigating the self-evaluative effects of supraliminally presented social comparison information has shown that, in the absence of information that might create a shared categorization, comparison information used here (i.e., clear, simple, and relatively extreme) typically yields contrast effects on explicit self-evaluation (see Blanton, 2001; Stapel & Koomen, 2000, 2001). The current study expands on prior work by testing for the occurrence of equivalent effects using subliminally presented social comparison information. Because there is no reason to assume that such effects are different, we predicted contrast effects. Thus, we predicted that participants primed with a young person would evaluate themselves as older than those primed with an elderly person; that participants primed with an attractive person would evaluate themselves as less attractive than those primed with an unattractive person; and that participants primed with an intelligent person would evaluate themselves as less intelligent than those primed with an unintelligent person.

Method

Participants and design. Participants ($n = 114$) were (male and female) undergraduates who participated in exchange for partial course credit. Forty students were randomly assigned to the two conditions (young, elderly) of Study 2A. Thirty-four students were randomly assigned to the two conditions (unattractive, attractive) of Study 2B. Forty students were randomly assigned to the two conditions (unintelligent, intelligent) of Study 2C.

Procedure, materials, and measures. The procedure was similar to the one used in Study 1, with a few notable exceptions: We used different priming stimuli (see below) and, after having completed the vigilance task, participants completed a task designed to measure self-evaluation rather than self-activation.

In Study 2A, priming stimuli were a photograph of the face of a baby girl (Diederik A. Stapel's youngest daughter; pretested on a 7-point *young–old* rating dimension, $M = 1.23$) and a photograph of a very elderly woman (pretested, $M = 6.18$). In Study 2B, priming stimuli were a photograph of a very unattractive (deformed) female face (pretested on a 7-point *unattractive–attractive* rating dimension, $M = 1.83$) and a photograph of a very attractive female face (pretested, $M = 6.41$). In Study 2C, priming stimuli were a photograph of a clown (pretested on a 7-point *unintelligent–intelligent* rating dimension, $M = 2.12$) and a photograph of Albert Einstein (pretested, $M = 6.63$). All these priming stimuli were faces with neutral expressions (means around 4, as pretested on a 7-point *sad–happy* rating dimension, see also Study 1).

Self-evaluation was measured as follows: In Study 2A, we asked participants to rate themselves on a 7-point *young–old* rating dimension. In Study 2B, we asked participants to rate themselves on a 7-point *unattractive–attractive* rating dimension. In Study 2C, we asked participants to rate themselves on a 7-point *unintelligent–intelligent* rating dimension. All three ratings were made ostensibly for the purposes of an ongoing national survey.

Results and Discussion

For Study 2A, an analysis of variance (ANOVA) of self-evaluation scores revealed the predicted contrast effect, $F(1, 38) = 4.51, p < .05$. Participants who were primed with an elderly person rated themselves as younger ($M = 4.75$) than did participants who

were primed with a young person ($M = 5.35$). For Study 2B, the ANOVA also showed contrast, $F(1, 32) = 4.20, p < .05$. Participants who were primed with an attractive person rated themselves as less attractive ($M = 5.18$) than did participants who were primed with an unattractive person ($M = 5.65$). For Study 2C, the ANOVA again showed contrast, $F(1, 38) = 4.13, p < .05$. Participants who were primed with Albert Einstein rated themselves as less intelligent ($M = 5.00$) than did participants who were primed with a clown ($M = 5.79$). To our knowledge, these results provide the first support for the hypothesis that social comparison can influence self-evaluation without conscious awareness of the comparison target.

Study 3

The main goal of Study 3 was to compare the influence of subliminally presented social comparison information on evaluations of the self versus evaluations of another person. Specifically, we subliminally exposed participants to a picture of Hitler (a prototypically hostile person) or of Gandhi (a prototypically friendly person) and then asked them to evaluate themselves as well as to form an impression of another person whose behavior could be interpreted as more or less hostile or friendly (Srull & Wyer's [1979] "Donald"). To date, no research has examined the impact of subliminally primed extreme person exemplars on person judgments. Given the fact that supraliminally primed extreme person exemplars typically yield contrast effects in subsequent person judgments (see Herr, 1986; Stapel, Koomen, & van der Pligt, 1997), one could argue that subliminal priming should yield a similar effect.

Our purpose here, however, was not to compare the direction of priming effects on judgments of self versus other but to compare the *sensitivity* of these judgments to subliminal primes. One might assume that evaluations of the self would be less influenced by contextual information than would evaluations of an ambiguous other. After all, people have more information about the self than others, and so it might be harder to get contextual changes in self-evaluation. Our position, however, is that people perform social comparisons so frequently that they become routinized to reduce cognitive demand. People thus should evaluate the self in comparison to social standards more easily and efficiently than they evaluate others. Given this position, and evidence that incidental subliminal exposure to person information can unintentionally activate self-knowledge (Study 1) and influence self-evaluations (Study 2), we predicted that subliminally presented person information would affect evaluations of the self more easily than it would affect evaluations of others.

To further assess the possible scope of subliminal person-priming effects, we included a measure of participants' mood. Our interest in this measure was to determine whether subliminal social comparisons specifically target self-evaluations or whether they also influence more general states, such as mood (cf. Stapel & Koomen, 2000). This is important because strong influence on mood could suggest a confound in Study 2; namely, that changes were not due to spontaneous self-evaluation but to mood congruency effects on the self.

Method

Participants and design.   Participants ($n = 44$) were male and female undergraduates who participated in exchange for partial course credit. The study had a single-factor (prime: Gandhi, Hitler) between-subjects design.

Procedure, materials, and measures.   The procedure and the materials were similar to those used in Studies 2, with a few notable exceptions: We used different priming stimuli (pictures of Gandhi and Hitler), but more important, we flashed these pictures in 13 (rather than 20; see Studies 1 and 2) experimental trials, and all the pictures (person pictures and pictures of Chinese characters) were flashed for 90 (rather than 110) ms. These two alterations were done to lower the influence the stimuli would have on social judgments in general. With relatively low-impact exposure to the person primes, we expected that the stimuli would not exert strong influences on judgments of others (see also Stapel, 2003; Stapel et al., 2002). Because of the relative ease of self-evaluation relative to other evaluation, however, we expected that the effects on self-evaluation would be relatively strong.

After completing the vigilance task, participants were asked to indicate their mood on a scale ranging from 1 (*negative*) to 7 (*positive*) using the item "how positive or negative is your mood at this moment, now that you have finished the vigilance task" (see Stapel & Koomen, 2000). Self-evaluation was measured as follows: We asked participants to rate themselves on a 7-point *unfriendly–friendly* rating dimension. We measured the impact of the primes on person perception to give people an ambiguous description of "Erik," whose behavior could be categorized as either hostile and unfriendly or assertive and friendly. The description was a Dutch translation of one used in previous priming research (e.g., Herr, 1986; Srull & Wyer, 1979; Stapel et al., 1997). All participants were asked to indicate their impressions of Erik on a 7-point *unfriendly–friendly* rating dimension. Self-evaluation and the impression formation (Erik) task were counterbalanced to control for possible order effects. An ANOVA showed no main or interaction effects of this order manipulation ($Fs < 1$, see also Stapel et al., 1997). Therefore, we ignored this factor in subsequent analyses.

Results and Discussion

A 2 (prime: Gandhi vs. Hitler) $\times$ 2 (judgment: self vs. other) repeated measures ANOVA revealed a main effect of judgment, $F(1, 42) = 38.05, p < .01$ (indicating that judgments of Erik were less positive than self-evaluations) and the predicted first-order interaction between prime and judgment, $F(1, 42) = 4.46, p < .05$. This interaction effect indicates that the prime did influence the two judgments differently, as predicted. In addition, simple main effects analysis of the influence of the prime on the two types of judgments revealed the presence of the predicted contrast effect on self-evaluation scores, $F(1, 42) = 7.18, p = .01$. Participants who were primed with a hostile person (Hitler) rated themselves as friendlier ($M = 5.86$) than did participants who were primed with a friendly person (Gandhi; $M = 5.09$). Subliminal exposure to pictures of Hitler versus Gandhi had no effect ($F < 1$) on ratings of Erik ($Ms = 3.64$ and 4.00, respectively).

This pattern supports the view that because of the proceduralized nature of the self-inferential process, subliminal person-priming exerts a stronger effect on self-judgments than on judgments of another person. We stress that this result should not be taken to mean that subliminal person priming can only affect self-judgment and can never affect other person judgments (see Stapel et al., 2002). It means only that, within the present paradigm and with the present stimuli and exposure times, person primes show an effect on self-evaluations but not on person evaluations. This indicates that the *threshold* for priming effects may be lower

for self-judgment than for non-self-judgments. This result supports the present perspective on the automaticity of self-evaluative social comparison effects.

Interestingly, even though person priming appears to have had especially strong effects on self-evaluations, it did not influence general measures of affect (see also Stapel & Koomen, 2000). Our subliminal priming manipulation did not lead to different scores on the mood measure after exposure to a picture of Hitler ($M = 5.36$) versus a picture of Gandhi ($M = 5.77$), $F < 1$. Although earlier studies of social comparison effects on mood found assimilation (e.g., Gump & Kulik, 1997) as well as contrast on mood measures (e.g., Lyubomirsky & Ross, 1997), this null effect after person priming is similar to what Stapel and Koomen (2000) predicted and found in studies of supraliminal person priming. These authors argued that person priming activates cognitions of a general valence ("friendliness") as well as specific person–self comparisons ("I am less friendly than Gandhi"; see Dijksterhuis, Spears, et al., 1998; Stapel & Suls, in press). In terms of general affect, the valence of the primes ("Gandhi is friendly and therefore positive") and the valence of self-evaluations ("I am not so friendly and therefore negative") may thus work in opposite directions.

Study 4

In the previous studies, we demonstrated the unconscious part of our from seeing-to-being hypothesis: Awareness of the presented information is not necessary for social comparison information to exert influence on self-evaluations. The main goal of Study 4 was to look at the spontaneous side of automaticity as well as to look at the unconscious side. Specifically, we investigated whether subliminally priming a picture of Albert Einstein or a clown would lead participants to self-evaluation effects in the absence of an explicit prompt to engage in conscious, self-evaluative activity. Inspired by earlier research by Zweigenhaft and Marlowe (1973), we used signature size as an implicit self-evaluation measure. Zweigenhaft and Marlowe found evidence that signature size is reliably correlated with explicit measures of self-regard (see also Hoorens, 1990; Koole, 2000).

Signature size offers an advantage over more traditional implicit measurement techniques because it is not only implicit but also nonreactive (Webb, Campbell, Schwartz, & Sechrest, 1966). Participants do not realize that they are being evaluated when they sign their names, nor are they prompted to make any judgment of any kind regarding the self. Most implicit measures do not have this feature. Whether making implicit associations or lexical decisions, participants probably realize that something about them is being assessed. This might activate self-presentational concerns (e.g., Fiedler & Bluemke, 2004), heighten self-awareness, evoke an evaluative mindset, or initiate any number of other psychological states that could alter self-evaluations. In contrast, participants signing consent forms typically have no reason to think that they are providing "data" on the self. In fact, when we explained to our participants the real reason that we collected their signatures, the universal reaction was one of surprise. A nonreactive measure such as this is needed to address the current research question, because our thesis is that social comparisons have spontaneous influences on the self. If our measure drew attention to the self or in any way triggered self-evaluations, our hypothesis could not be tested.

With this in mind, we predicted that participants primed with Albert Einstein would show lower implicit self-evaluations (i.e., smaller signature sizes) than would participants primed with a clown. As in Studies 2 and 3, we also measured the impact of social comparison information on explicit self-evaluation. In addition to providing a replication of Studies 2 and 3, these data could be used to determine the validity of the implicit evaluation hypothesis.

Method

Participants and design. Participants ($n = 53$) were (male and female) undergraduates who were randomly assigned to one of the experimental conditions. The study had a single-factor (prime: Albert Einstein, clown, control) between-subjects design. Participants received 5 Dutch guilders (US$2.50) for participating.

Procedure, materials, and measures. The procedure and the materials were similar to the ones used in Study 2C, with the exception that we added a no-prime control condition to the design.

Implicit self-evaluation (signature size) was measured as follows: At the beginning of the study (before the actual experiment started), all participants were requested to sign a consent form. Immediately after completing the vigilance task, participants were asked to sign a form titled "Institute for Perception Studies" (IPS). Participants were told that the IPS ostensibly cosponsored this research program and that the signatures were needed in order for them to be paid for their participation in the experiment. Signature size was assessed by drawing the smallest possible rectangle around each participant's (premanipulation) consent signature and (postmanipulation) IPS signature (following Koole, 2000). The resulting height and width were multiplied to yield an index for each participant's consent and IPS signatures. These indices thus represent the surface (in square cm) of the smallest possible rectangle that could contain the signature. Analyses were designed to investigate the effects of the experimental manipulation on the IPS signature, with consent signature used to control for individual difference in signature size.

Explicit self-evaluation (self-ratings) was measured as follows: After participants had provided their signatures, they then answered some questions about themselves, ostensibly to determine whether their personality had any impact on the tasks they had just completed. First (as in Study 2C), we asked participants to rate themselves on a 7-point *unintelligent–intelligent* rating dimension. The rest of the questions were fillers.

Results and Discussion

The effects of priming condition on signature size were assessed using a one-way analysis of covariance (ANCOVA), with condition treated as the independent variable, postmanipulation IPS signature treated as the dependent variable, and premanipulation consent signature treated as a covariate. To create meaningful units in the dependent variable, we centered scores on the dependent variable on scores on the covariate. Thus, a positive score on the adjusted mean for this deviation score represents an increase in signature size (growing self-esteem) after the vigilance task and a negative score represents a decrease in signature size (shrinking self-esteem) after the vigilance task.

The resulting analysis showed the predicted effect, $F(2, 49) = 3.61$, $p < .05$. As Table 1 shows, the deviation score for signature in the Einstein picture condition was negative ($M_{adjusted} = -92.46$) and differed significantly from the positive deviation score in the clown picture condition ($M_{adjusted} = 210.89$), $F(1, 49) = 7.04$, $p < .05$, a contrast effect. The deviation scores in the no-prime control participants were halfway between scores of

Table 1

*Mean Adjusted Signature Deviation Score and Explicit
Self-Evaluation as a Function of Prime*

Measure	Prime		
	Einstein	Clown	Control
Signature deviation score	−92.46	210.89	106.12
Self-evaluation	5.00	6.00	5.50

Note. For the signature deviation score a positive score represents an increase in signature size (growing self-esteem) after the vigilance (priming) task and a negative score represents a decrease in signature size (shrinking self-esteem). Explicit self-evaluation was measured on a 7-point (*unintelligent–intelligent*) scale.

participants in these two experimental conditions (M_{adjusted} = 106.12).[1] An ANOVA on the explicit self-evaluation measure, participants' self-ratings on the unintelligent–intelligent dimension also showed contrast, $F(2, 50) = 3.61, p < .05$. As Table 1 shows, participants who were primed with Albert Einstein, rated themselves as less intelligent ($M = 5.00$) than did participants who were primed with a clown ($M = 6.00$), $F(2, 50) = 7.24, p < .01$. No-prime control participants' self-evaluations were halfway between those of participants in the experimental conditions ($M = 5.50$).

These results provide the first evidence that social comparison information can affect implicit self-esteem measures, and they do so using a social comparison manipulation that operated outside of conscious awareness (as in Studies 2 and 3). Importantly, however, this contrast effect was revealed not only on this relatively uncommon implicit self-evaluation measure but also on the more traditional explicit self-evaluation measure traditionally used, thus replicating Studies 2 and 3. In this regard, it is interesting that the implicit and explicit measures were highly related. Controlling for the premanipulation signature size, the partial correlation between the postmanipulation signature size and the explicit self-esteem measure was $r(49) = .91, p < .01$. This provides evidence of the validity of our measure and corroborates the notion that change in signature size provides a valid indicator of change in self-esteem (see also Hoorens, 1990; Koole, 2000; Zweigenhaft & Marlowe, 1973).

This high correlation between our implicit and explicit measures may be somewhat puzzling to some because a host of theorized differences exist between implicit and explicit self-evaluations. Implicit self-evaluations are presumably more automatic (unconscious, unintentional, efficient, and uncontrollable) compared with explicit self-evaluations (Bargh, 1989; cf. Fazio & Olson, 2003). Furthermore, implicit self-evaluations are thought to be produced by more primitive, affective, self-enhancement mechanisms, whereas explicit self-evaluations may involve more sophisticated, cognitive judgments of the self (e.g., Koole, Dijksterhuis, & Van Knippenberg, 2001; Mussweiler & Strack, 2000). On the basis of this logic, many have suggested that implicit and explicit self-evaluations assess two different aspects of self-knowledge (Banaji, 2001; Bosson, Swann, & Pennebaker, 2002; A. G. Greenwald & Farnham, 2000), whereas others have argued that the degree of discrepancy reflects measurement variance that often is not of theoretical interest (Blanton, Jaccard, & Gonzales, 2004; Fazio & Olson, 2003).

Although the conditions in which implicit and explicit measures will and will not converge require future study, we tentatively suggest three interdependent factors that probably contributed to the especially high correlations in the current study. First, there likely is some general evaluation that influences both implicit and explicit self-esteem. Second, participants probably were not motivated to distort either their explicit or implicit responses (e.g., for social desirability reasons). Third, the experimental manipulations exerted influence that occurred outside of awareness. That is, participants not only failed to realize that they had been exposed to stimuli that might influence their implicit responses, but they also failed to realize that they had been exposed to stimuli that might influence their explicit responses. The lack of insight on the part of our participants to the factors that were influencing them and how this influence could be manifest can explain why results on the implicit measures mirrored those on the explicit measures (see Koole et al., 2001).

Study 5

The main goal of Study 5 was to test the robustness and generality of the automatic social comparison effects found in Study 4. In this study, we were interested in examining the impact of subliminally primed social comparison information on a more common measure of implicit self-evaluations than signature size. At the same time, we wanted to avoid a measure that might be interpreted by the participant as assessing hidden evaluations of the self. We therefore used a measurement technique used to study the automatic self-evaluation effect (see Bosson et al., 2000; Dijksterhuis, Spears, et al., 1998; Hetts & Pelham, 2001; Mussweiler & Bodenhausen, 2002; Mussweiler & Strack, 2000; Stapel & Suls, in press). After participants were primed subliminally with social comparison information (i.e., unattractive vs. attractive persons), they were given a lexical decision task that included words associated with being attractive (e.g., *pretty, beautiful*), words associated with being unattractive (e.g., *ugly, unattractive*), and neutral words and nonwords. These words were primed either with words closely associated with the self-concept (*I, me*) or with unrelated words (*and, or*).

Subliminal presentation of self-related words has been demonstrated to activate the self-concept, so that lexical decisions trials that are preceded by such primes increase accessibility of self-related knowledge (see Dijksterhuis, Spears, et al., 1998). Most important, research by Mussweiler and Strack (2000) has demonstrated that accessibility is influenced by supraliminal social comparison. This study extends this earlier investigation by testing for influences of subliminal social comparison information on the accessibility of self-knowledge. Consistent with Studies 2, 3, and 4 and with Mussweiler and Strack's work using supraliminal primes, we predicted that we would observe a contrast effect. That

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[1] An alternative way of analyzing the data would be to use a repeated measures design, with the experimental condition treated as a three-level between-subjects factor and with "time" treated as a two-level within-subjects factor. When this was done, we found the predicted two-way interaction between experimental condition and time, $F(2, 50) = 3.72, p < .05$. This patterning of means was consistent with our predictions. However, for ease of presentation, we chose not to detail these analyses in the body of the text.

is, when primed with an attractive person, participants should be faster in responding to words that are associated with being unattractive than to words that are associated with being attractive. The opposite should be true when they were primed with an unattractive person: Participants should respond faster to attractiveness-related words than to unattractiveness-related words. Moreover, because we predicted that these effects would be driven by the occurrence of self-evaluation effects rather than by the activation of semantic knowledge in general, they should only occur if the self-concept is activated (i.e., the lexical decision trials are preceded by self-primes; see Dijksterhuis, Spears, et al., 1998; Stapel & Suls, in press).

Method

Participants and design. Participants ($n = 30$) were male and female undergraduates who participated in exchange for partial course credit. The participants were randomly assigned to one of the experimental conditions (unattractive, attractive) of a single-factor between-subjects design.

Procedure and materials. On arrival to the laboratory, participants were placed in individual cubicles and told that they would be serving in several unrelated pilot studies and that they would receive all instructions by means of a computer program. The experimenter started the computer program and left.

The first computer task participants had to complete was identical to the vigilance task used in Study 2B. The priming stimuli were a photograph of a very unattractive (deformed; pretested, $M = 1.73$) female face and a photograph of a very attractive female face (pretested, $M = 6.41$).

When they had completed the vigilance task, participants worked on the lexical decision task. This task was modeled after Dijksterhuis, Spears, et al. (1998), Mussweiler and Strack (2000), and Stapel and Suls (in press). Participants were told that this task concerned a word recognition experiment, the goal of which was to find how fast people could discriminate between words and nonwords. Participants were asked to focus on the screen every time a string of XXXs appeared. They were told this string would be followed by a word or a nonword and were asked to decide as fast as possible whether a letter string was an existing word or not. A total of 41 trials were presented. The first 5 trials were practice trials, whereas trials 6–41 were the critical ones. Of the critical trials, in 18 cases the target was an existing word, whereas in the remaining 18 cases the words were random letter strings. Of the 18 words, 6 were attractiveness related (e.g., *pretty, attractive*), 6 were unattractiveness related (e.g., *ugly, unattractive*), and 6 were unrelated to the attractiveness dimension (e.g., *silent, warm*). For each group of 6 target words, 3 of the targets were preceded by self-concept primes (*I, me, my*), whereas the remaining 3 were preceded with neutral primes (*the, and, or*). Following Dijksterhuis, Spears, et al. (1998) and Stapel and Suls (in press), there were two versions of this task, so that 3 specific words that were primed with the self-concept in one version were primed with control words in the other and vice versa. The 36 trials were presented in random order. The trials involved the following sequence of events. First, we presented a fixation stimulus (XXXX) at the center of the screen for 1,000 ms. Then the prime was presented at the same location for 15 ms and was immediately masked by the fixation stimulus again for 500 ms. Then the target word was presented, overwriting the masking stimulus, and remained on the screen until participants had made the lexical decision. After 2 s, the same sequence was repeated with the next trial.

Results and Discussion

We conducted logarithmic transformations on the response latencies to reduce the skewness of the response distribution. Our analyses were computed on these transformed values. For ease of interpretation, however, we report the nontransformed means in Table 2 (see Dijksterhuis, Spears, et al., 1998; Stapel & Suls, in press). Both transformed and untransformed means are presented in the text. Following Mussweiler and Strack (2000) and Stapel and Suls (in press), in our main analysis, we compared response latencies for comparison-congruent words (i.e., attractive-related words for the attractive prime and unattractive-related words for the unattractive prime) and comparison-incongruent words (i.e., unattractive-related words for the attractive prime and attractive-related words for the unattractive prime). Table 2 shows that when the target words were preceded by a neutral prime, comparison-congruent words were recognized faster ($M = 517$ ms, transformed 2.69) than comparison-incongruent words ($M = 588$ ms, transformed 2.76), $F(1, 29) = 7.04$, $p < .05$. This is evidence for a general semantic priming effect. Priming an attractive person increased the accessibility of the concept of attractiveness, whereas priming an unattractive person increased the accessibility of the concept of unattractiveness. More important, however, Table 2 also shows that when target words were preceded by self words, comparison-incongruent words were recognized faster ($M = 518$ ms, transformed 2.70) than comparison-congruent words ($M = 571$ ms, transformed 2.74), $F(1, 29) = 5.35$, $p < .05$. In a 2 (prime type: self, control) × 2 (congruency: comparison prime-congruent, comparison prime-incongruent words) mixed ANOVA, together these effects yielded the predicted interaction, $F(1, 29) = 22.59$, $p < .01$ (other effects $Fs < 1$).

These results further corroborate our hypothesis that self-evaluative social comparison effects can occur without conscious awareness of that information as well as without the conscious intention to engage in self-evaluative activity. Although previous studies have used the automatic self-evaluation effect to investigate the impact of supraliminally presented social comparison information, the present study was the first to reveal automatic self-evaluation effects after priming social comparison information subliminally. This finding replicates the contrast effect in Studies 2–4. Thus, even though participants who were primed with an attractive rather than an unattractive person were faster in responding to attractiveness-related words than to unattractiveness-related words (a general semantic priming effect), the opposite occurred when the self-concept was activated. The most important finding of this study is that, after subliminal exposure to an attractive person, I–unattractive associations were activated automatically, whereas after a subliminal exposure to an unattractive person, I–attractive associations were activated automatically. Together with Study 3, which revealed automatic social comparison effects on signature size, the present study provides strong evidence that the effects of social comparison on self-evaluation require neither conscious awareness of the social comparison information, nor the

Table 2

Response Latency Means (in Milliseconds) as a Function of Prime Type and Congruency

Prime type	Target word	
	Comparison congruent	Comparison incongruent
Self	571	518
Control	517	588

conscious intention to engage in self-evaluative activity. In short, social comparisons can occur spontaneously and unconsciously.

Study 6

In Study 6, we set out to determine whether the observed contrast effects in the previous studies are responsive to a person's interest in evaluating the self. If so, then this would be consistent with Festinger's (1954) original article on social comparison. He viewed self-certainty as the master motive underlying the drive to compare with others (cf. Stapel & Tesser, 2001). Consistent with this, Gibbons and Buunk (1999), concluded in a review of the literature that most of the factors found to be instigators of social comparison involve uncertainty about the self: "Generally speaking, interest in social comparison is associated with uncertainty" (p. 130). Thus, periods of stress, novelty, competition, or change promote the need for comparison information. Similarly, low self-esteem, depression, and neuroticism—all traits with a significant uncertainty component—can be linked to increased interest in social comparison (Gibbons & Buunk, 1999).

If uncertainty is an important precursor to social comparison, then the spontaneous effects of subliminal social comparison on self-evaluation should be especially strong when people are uncertain. To test this hypothesis, the present study crossed the subliminal person-priming manipulation we used in Study 2C and Study 4 (intelligent vs. unintelligent) with a (high vs. low) self-certainty manipulation. Self-certainty was manipulated using a (bogus) computer-administered personality questionnaire, modeled after Stapel and Tesser (2001). After completing the questionnaire, respondents in the certain self-view condition were told that based on their answers, the computer could easily construct a clear and consistent personality profile. Respondents in the uncertain self-view conditions were told that the computer was unable to construct a clear personality profile. Participants then completed the vigilance task through which either a picture of an intelligent person (Albert Einstein) or an unintelligent person (a clown) was primed subliminally. Just as in Study 4, we used change in signature size as an implicit self-evaluation measure and also included an explicit self-evaluation measure. However, whereas in the previous studies we measured explicit self-evaluation using a trait-specific measure (e.g., unintelligent–intelligent after Einstein vs. clown priming), we now used a more global, affective self-evaluation measure, Robins, Hendin, and Trzesniewski's (2001) one-item measure of global self-esteem. This provided a chance to test for associations between the implicit measure and explicit self-evaluation. On the basis of our findings in the previous studies, we predicted contrast effects on both implicit and explicit self-evaluation, but only when participants were low in self-certainty.

Method

Participants and design. Sixty male and female undergraduates were randomly assigned to the conditions of a 2 (prime: Albert Einstein, clown) × 2 (self-certainty: certain, uncertain) between-participants design. Participants received 5 Dutch guilders (US$2.50) for participating.

Procedure and materials. On arrival to the laboratory, participants were seated in individual cubicles and told that they would be serving in several unrelated studies and that they would receive all instructions from the computer. The experimenter started the computer program and left.

Participants first performed several "word comprehension" tasks (e.g., unscrambling fruit names).

Next, they were asked to complete a bogus personality questionnaire (modeled after Stapel & Tesser, 2001). In this, participants were first asked to complete a "new and impressionistic" personality questionnaire, titled "The New Personality." This questionnaire consisted of 15 (slightly edited) items that were selected from personality scales reported in J. P. Robinson, Shaver, and Wrightsman (1999). Examples are "Spontaneity can be an excuse for irresponsibility" and "Settling in another country is probably difficult." All items were scored on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). After completion of this questionnaire, participants were told that the computer had recorded their responses and would try to compute their personality profile. In the self-uncertain condition, participants then read that the computer was unable to compute a clear personality profile. "The consistency of your responses is not high enough to construct a clear picture of who you are. For your information, this is not uncommon. Sixty percent of the time the computer program we use to compute the consistency of individuals' personality is unable to construct a clear profile." This should induce a belief in participants that their personality was unclear and inconsistent, which should increase feelings of uncertainty about the self and activate a need to find an answer to the ubiquitous question "who am I?" (see Stapel & Tesser, 2001). In the self-certain condition, participants were told that the computer was able to compute a clear and consistent personality profile. "The consistency of your responses is high enough to construct a clear picture of who you are. For your information, this is not uncommon. Sixty percent of the time, the computer program we use to compute the consistency of individuals' personality is able to construct a clear profile."

When they had completed the New Personality Questionnaire, participants worked on the vigilance task that we used in the studies described above. The priming stimuli were a photograph of a clown and a photograph of Albert Einstein.

Implicit self-evaluation (signature size) was measured in the same way as in Study 4: Participants provided a signature at the beginning of the experiment and immediately after the priming task. As before, postmanipulation signature size was treated as the dependent variable with premanipulation signature size treated as a covariate. Postmanipulation scores were centered on premanipulation scores, such that positive adjusted mean represented an increase in signature size (growing self-esteem) after the vigilance task and a negative score represented a decrease in signature size (shrinking self-esteem) after the vigilance task.

Explicit self-evaluation (self-ratings) was measured as follows: After participants had provided a signature, they were given Robins et al.'s (2001) one-item self-esteem measure. They were asked to indicate the extent to which they agreed (1 = *not at all*, 7 = *very much*) with the item "I have positive self-esteem." Following this, participants were given a manipulation check on the certainty manipulation. They were asked to use a number between 1 and 7 to indicate whether their self-view was 1 (*unstable and inconsistent*) or 7 (*stable and consistent*).

Results and Discussion

Manipulation check. As expected, a Prime × Self-Certainty ANOVA revealed a main effect of self-certainty on responses to the stability and consistency question, $F(1, 58) = 7.88, p < .01$ (other effects, $Fs < 1$). Participants for whom the computer could not compute a consistent personality profile rated their self-views as less consistent and stable ($M = 4.77$) than did participants who were told that the computer could construct a clear and consistent personality profile ($M = 5.73$).

Main analyses. We used a Prime × Self-Certainty ANCOVA. Premanipulation scores were treated as the covariate, and centered postmanipulation scores were treated as the dependent variable. This revealed the expected interaction effect, $F(1, 55) = 3.90, p =$

.05 (other effects, $ps > .11$). As Table 3 shows, low-certainty participants who were primed with Albert Einstein had a smaller signature score ($M_{adjusted} = -97.55$) than did participants who were primed with a clown ($M_{adjusted} = 223.71$), $F(1, 55) = 12.77$, $p < .01$. In contrast, high-certainty participants who were primed with Albert Einstein had signature sizes ($M_{adjusted} = 122.61$) that did not differ from those of the participants primed with a clown ($M_{adjusted} = 88.16$), $F < 1$. This pattern revealed that the automatic social comparison effect occurred only among those who were low in self-certainty.[2]

A Prime $\times$ Self-Certainty ANOVA on the explicit self-evaluation measure (participants' feelings of self-worth) showed a similar interaction pattern of results, $F(1, 56) = 6.10$, $p < .05$ (other effects, $ps > .29$). As Table 3 shows, low-certainty participants who were primed with Albert Einstein rated their self-esteem lower ($M = 5.13$) than did participants who were primed with a clown ($M = 6.13$), $F(1, 56) = 6.33$, $p < .05$, whereas high-certainty participants showed no difference in explicit self-esteem as a function of prime ($F < 1$).

As in Study 3, after controlling for premanipulation signature size, the partial correlation between the postmanipulation signature size and the explicit self-evaluation was strongly correlated, $r(56) = 0.87$, $p < .01$. This provides further evidence of the validity of signature size as an estimate of self-esteem (see also Koole, 2000) and again reveals an instance in which implicit and explicit ratings are strongly related.

Implications. The role of uncertainty as one of the key instigators of social comparison effects has been a part of social comparison theorizing for half a century (Festinger, 1954). The present study demonstrated the importance of this time-honored construct as a factor that also influences the occurrence of automatic social comparison. The results showed that subliminally priming person information may yield contrast effects on implicit as well as on explicit self-evaluation measures, but this only occurred when there was a level of uncertainty that would make social comparison meaningful. Interestingly, when participants in the high-certainty condition were given feedback indicating that they have a "clear and consistent" profile, the contrast effect observed in Studies 3 through 5 became nonsignificant. This suggests not only that comparison depends on self-certainty but also that the "default value" of people may be a degree of uncer-

tainty. It is only when people encounter situations that give them high state levels of certainty that automatic comparisons no longer occur.

The moderating effect of self-certainty clearly shows that social comparison effects may at the same time be both automatic and conditional (see Bargh, 1989, on conditional automaticity). Thus, the fact that social comparison effects can occur spontaneously and without conscious awareness should not be misunderstood as meaning that social comparisons are reflexive responses to other people. Given the sizable number of targets of comparison to which people are exposed, it would seem absurd to suggest that social comparison is an inevitable consequence of perceiving another person (see also Cantor & Blanton, 1996; Gilbert et al., 1995; Stapel, 2003). To put it simply, although automatic comparisons may abound, this does not mean that they are without boundaries.

Adapting a phrase by Fiske and Taylor (1991), we argue that these findings paint a picture of the social perceiver as an *automatic motivated tactician*. This individual has a variety of automated processes at the ready and selects from among them on the basis of current goals, needs, and environmental demands. This portrayal of the social perceiver as a quick but flexible information processor differs from previous perspectives in that it allows for flexibility and plasticity as a feature of automatic (rather than controlled) processing. In most previous discussions of the importance of flexibility in information processing and behavioral regulation, flexibility typically has been defined as a property of controlled (rather than automatic) processing (see Bargh, 1997; Gilbert et al., 1995; Logan, 1988). Whereas automatic processing is seen to have the benefits of occurring quickly and requiring little attentional resources, it is also seen as rigid, self-governed, and difficult or impossible to regulate (see M. D. Robinson, 1996, pp. 671–672).

The current results suggest that the automaticity–controlled continuum is not inextricably bound to the rigidity–flexibility continuum. Our results show that whether subliminally presented person information affects the self depends on whether people are motivated to do so. Thus, people's goals may affect whether automatic processing yields self-evaluation effects, and controlled processing is not the only route through which a system may obtain flexibility.

This notion of "flexibility" should not be confused with the notion that people can "correct" their comparisons, as discussed in the cognitive-load model of Gilbert et al. (1995). We do not assume that our high-certain individuals did not compare because they exerted effort. These individuals were exposed to comparison information outside of their awareness, and the effects on self-evaluation were measured using nonreactive implicit indices. It thus seems likely that our self-certain participants were no more aware that they had refrained from comparing than our self-

Table 3

Mean Adjusted Signature Deviation Score and Explicit Self-Evaluation as a Function of Prime (Einstein, Clown) and Self-Certainty (Uncertain, Certain)

Measure	Einstein		Clown	
	Certain	Uncertain	Certain	Uncertain
Signature deviation score	122.61	−97.55	88.16	223.71
Self-evaluation	5.80	5.13	5.40	6.13

Note. For the signature deviation score, a positive score represents an increase in signature size (growing self-esteem) after the vigilance (priming) task and a negative score represents a decrease in signature size (shrinking self-esteem). Explicit self-evaluation measured the extent to which participants agreed (1 = *not at all*, 7 = *very much*) with the item "I have positive self-esteem."

[2] An alternative way of analyzing the data would be to use a repeated measures design, with the priming condition and self-certainty treated as a between-subjects factor and with time treated as a within-subject factor. When this was done, we found the predicted three-way interaction between priming stimulus, self-certainty, and time, $F(1, 56) = 4.02$, $p < .05$. Analyses of means were consistent with predictions, but we chose not to detail these analyses in the body of the text for ease of presentation.

uncertain participants were aware that they had engaged in comparison. It appears unreasonable, then, to assume that differences between the two groups reflected differences in controlled processing. What instead appears to have occurred is that only the uncertain individuals approached the vigilance task with an epistemic need to reflect on the self. They therefore used the primes to draw self-inferences. The certain individuals had no such needs, and so the primes had no such effects.

General Discussion

Summary of Findings

It appears that social comparison effects can occur without awareness of the comparison information and without the explicit intention to evaluate the self. In our studies, we found strong support for a perspective that views social comparisons as routinized, automated responses. We reasoned that, if it is functional for humans to compare with others, then it should be possible for social comparison effects on self-evaluation to occur unconsciously and spontaneously (Stapel, 2003).

We tested the automaticity of social comparison effects in a series of studies. In all of these, participants went through a vigilance task designed to prime subliminally the relevant stimuli. Study 1 demonstrated that priming other people activates the self, even when this priming occurs without awareness. Study 2 showed that subliminally presented comparison information yielded contrast effects on explicit self-evaluations. For several evaluative dimensions (i.e., young–old, unattractive–attractive, unintelligent–intelligent), downward comparison information (e.g., a picture of an unattractive person) resulted in higher self-evaluations than upward comparison information (e.g., a picture of an attractive person). Study 3 provided support for the notion that subliminally presented person information more readily exerts an effect on self-evaluations than it does on judgments of both an ambiguous person description and assessments of one's mood. Studies 4, 5, and 6 extended the study of subliminal social comparison effects to implicit self-evaluations. Study 4 showed that participants' signatures got smaller when participants were primed subliminally with upward comparison information and bigger when they were primed subliminally with downward comparison information. Study 5 replicated this contrast effect using the automatic self-evaluation procedure. The results of a lexical decision task revealed that associations between "I" and "unattractive" were facilitated after subliminal exposure to an attractive person, whereas associations between "I" and "attractive" were facilitated after a subliminal exposure to an unattractive person. Study 6 showed that self-uncertainty is an important moderator of automatic social comparison effects. This study used signature size as an implicit measure and a one-item esteem measure as an explicit measure. Results showed that subliminal exposure to comparison information yielded contrast on self-views, but only when participants were uncertain about the self.

Together, these results clearly support the view that neither conscious awareness (of the comparison target) nor intention (to self-evaluate) is needed for social comparisons to yield significant self-evaluation effects. People make spontaneous self inferences (cf. Uleman et al., 1996) on the mere exposure to person information, such that seeing automatically implies being.

Self-Perception Versus Self-Report

We feel it is important to note that the present studies not only support our seeing-to-being perspective but also provide evidence against a strong but often ignored threat to the validity of the vast majority of studies showing social comparison effects on (explicit) self-evaluation. Because past research has been carried out using self-report, an alternative conclusion to draw from the social comparison literature is that social comparison information changes how people report on the self using particular scales—not how they perceive the (unscaled) self. There are many reasons why the differences in how social objects are rated on a psychometric scale might not reflect differences in how these objects are perceived or evaluated (see Anderson, 1981; Biernat, Manis, & Nelson, 1991; Blanton & Jaccard, 2004, in press). Consideration of this work can undermine confidence in the veracity of past social comparison effects because research in social comparison has relied almost entirely on subjective rating scales. The concern here is that documented effects of social comparison on ratings of the self may not have reflected differences in how people truly evaluate the self but, rather, differences in how people use rating scales to report on the self.

In light of this concern, Mussweiler and Strack (2000) recently investigated the effects of social comparison on subjective versus objective ratings scales. They found that social comparison results in *contrast* when explicit self-evaluative judgment took the form of a subjective judgment along a given rating scale (e.g., "How athletic are you?," rated on scale from 1 = *little athletic*, 9 = *very athletic*), but *assimilation* when it took the form of an objective judgment about physical quantities (e.g., "How fast are you?," rated in miles per hour). The reasoning behind this is that comparison others are used to interpret the meaning of the scale anchors in subjective rating scales, resulting in contrast. Objective judgments, however, are externally anchored, based on consensual standards. Thus, objective scales retain the same meaning across comparison contexts, and so a much different effect emerges.

The current studies demonstrate that subliminally primed social comparison information exerts contrastive rather than assimilative effects on nonanchored ratings (i.e., signature size and automatic self-evaluations). This seems to indicate that the present contrast effect cannot be attributed to changing psychometric dynamics across experimental conditions. This offers encouragement that the contrast effects that have been documented and studied for decades in the social comparison literature are more than just a response artifact.

Assimilation Versus Contrast

Our research clearly demonstrated instances in which automatic comparisons resulted in contrast effects that are in line with most of the early work on social comparison. As Brown (1998) noted in a summary of the relevant literature, "Most research shows evidence for a contrast effect" (p. 117). We stress that we do not take our results to mean that automatic social comparison effects should *always* result in contrast. In fact, many subliminal priming studies in other domains of research (such as person perception, behavior regulation, affect infusion, and stereotyping) show assimilation. For example, several studies have shown that the mere activation of social knowledge structures is sufficient to promote behaviors

that are associated with these structures. Thus, participants primed with words related to being rude subsequently behave more rudely (interrupt an ongoing conversation) than do participants not so primed; participants primed with words related to the stereotype of the elderly (Florida, wrinkle) behave more like the elderly (walk more slowly down the hallway after leaving the experiment) than do participants not so primed; and participants primed with words related to being smart behave more intelligently (score better on a subsequent knowledge test) than do participants primed with stupid stereotypes (for reviews, see Bargh, 1997; S. C. Wheeler & Petty, 2001).

How is this possible? How can it be that in the current studies of automatic social comparison, we consistently found contrast effects, whereas previous studies of automatic behavior consistently have found assimilation effects? Some guidance in answering this question may come from studies by Stapel and Koomen and their colleagues (e.g., Stapel et al., 1997; Stapel et al., 2002). Stapel and Koomen suggest that when predicting priming effects it is important to attend to the *extremity* and *distinctness* of the primed information.

In an attempt to integrate a wide range of moderators into one comprehensive model, Stapel and Koomen (2000) proposed in their interpretation/comparison model that the impact of social comparison information mainly depends on its use (see also Blanton, 2001). They argued that the common thread running through investigations of assimilation versus contrast effects is the following logic: Assimilation is more likely when comparison information is used as an *interpretation frame* to define and make sense of the self (answering "Who am I? X or Y?"), whereas contrast is the more likely outcome when comparison information is used as a *standard* to evaluate the self on relevant dimensions (answering the question "How X am I?"; for detailed tests of this logic, see Stapel & Koomen, 2000; Stapel & Suls, in press). Recent tests of this interpretation/comparison logic have identified several determinants of whether the impact of information on subsequent evaluations is more likely to be driven either by interpretation or by comparison. For example, Stapel and Koomen (2000) found that when the behavior of a comparison target activates extreme and distinct person information (e.g., "Stanley is rich"), self-evaluation is likely to show a comparison contrast ("I am poor"). Conversely, when the behavior of a comparison target activates abstract trait information (e.g., "rich"), self-evaluation is likely to show an interpretation assimilation ("I am rich"). Similarly, Stapel et al. (1997) investigated the impact of priming person judgments and found that distinct person information is especially likely to yield comparison contrast when the prime is extreme rather than moderate. That is, priming Hitler (extremely hostile) versus Gandhi (extremely friendly) typically yields contrast, but priming Joe Frazier (moderately hostile) versus Robin Hood (moderately friendly) yields assimilation (see also Herr, 1986).

The model by Stapel and Koomen (2000) offers straightforward suggestions for our present concern: the study of automatic other–self comparisons. For example, it suggests (a) using subliminal primes that vary the salience of the comparison person versus the salience of the person's traits and (b) using subliminal primes that vary the extremity of the comparison target. To test whether this logic indeed applies to the current paradigm—that is, when social comparison information is primed subliminally—we performed two additional studies. In one study we manipulated the distinct-

ness or person status of a prime (i.e., an actual person or a trait), in another study we manipulated the extremity of a person prime (i.e., an extreme or moderate trait).

In the first study ($n = 73$), participants were primed subliminally (see Studies 1–6) with words denoting intelligence or lack of it. These words were either traits (intelligent vs. unintelligent) or names of persons (Einstein vs. clown). As in the previous studies reported here, results showed contrast when person information was primed. Participants' signature size was smaller when Einstein was primed ($M = -112$) than it was when a clown was primed ($M = 157$), $F(1, 71) = 7.54, p < .01$. However, when trait person information was primed, the opposite effect occurred (assimilation). Priming positive traits caused people's signatures to grow ($M = 190$), whereas priming negative traits caused people's signatures to shrink ($M = -153$), $F(1, 71) = 4.05, p < .05$.

In the second study ($n = 61$), participants were primed subliminally with the photographs (pretested on a 7-point *unattractive–attractive* rating scale) of an extremely attractive ($M = 6.41$) or an extremely unattractive ($M = 1.83$) female face, which we used in Study 2C, or with photographs of a moderately ($M = 5.02$) or an extremely unattractive ($M = 3.56$) female face. Results showed contrast when extreme person information was primed. Participants' signature size was smaller when an extremely attractive face was primed ($M = -95$) than when an extremely unattractive face was primed ($M = 192$), $F(1, 59) = 4.70, p < .05$. Results showed assimilation when moderate person information was primed. Priming a moderately attractive face caused people's signature to grow ($M = 140$), whereas priming a moderately unattractive face caused people's signature to shrink ($M = -130$), $F(1, 59) = 3.92$, $p = .05$.[3]

These effects suggest convincingly that, even though the studies presented here show contrast, this should not be taken to mean that the automatic relation between what people see in others and what they see in the self will always reveal an incongruency. Our studies show that mere subliminal exposure to social comparison information may be sufficient to activate the self and to spark (implicit and explicit) self-evaluative processes. Whether the evaluative implications are assimilative or contrastive is likely to depend on a host of factors, such as, for example, the distinctness and extremity of the primed person information (see also Blanton, 2001; Stapel & Koomen, 2000, 2001; Tiedens & Fragale, 2003).

Conclusion

These studies show that the perceptual system and the self system are intrinsically linked and can influence each other with both ease and spontaneity. Now that we appreciate that social comparisons may occur unconsciously and spontaneously, further work is needed to determine whether automatic comparisons effects differ from those shown in past studies of conscious and deliberate comparisons. Until that time, the current studies at least make it known that the relationship between perception and self-evaluation is not only quick and strong but also complex and

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[3] In the extremity study we also measured mood in the same way as we did in Study 3 (after the priming episode, before the self-evaluations). Again, the mood measure did not show an effect of our manipulations (all Fs < 1). For more details of the distinctness and the extremity studies described here, please write to one of the authors.

dynamic. In this light, perhaps we have been too simplistic in stating as our thesis that people move "from seeing to being." A more accurate statement would be that "seeing can lead quickly, efficiently, flexibly, and spontaneously to being." This phrase is less catchy than the original, but all the more interesting.

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