

How social perception can automatically influence behavior

Melissa J. Ferguson¹ and John A. Bargh²

¹Department of Psychology, Cornell University, Ithaca, NY 14853, USA

²Department of Psychology, Yale University, New Haven, CT 06520, USA

Do we always know the reasons for our actions? Or is our behavior sometimes unknowingly and unintentionally influenced by what we have recently perceived? It has been traditionally assumed that the automatic influence of knowledge in memory is limited to people's interpretation of the world, and stops short of shaping their actual behavior. Researchers in experimental social psychology have begun to challenge this assumption by documenting how people's behaviors can be unknowingly influenced by knowledge that is incidentally activated in memory during social perception. We review findings that suggest that the social knowledge that is incidentally activated while reading words or imagining events subsequently affects participants' behaviors across a range of ostensibly unrelated domains.

Experimental social psychologists have amassed a large body of findings over the past three decades suggesting that social knowledge is automatically activated in memory during the natural course of perception. That is, while people are seeing and listening to the world around them, social knowledge that corresponds to perceived stimuli is spontaneously and immediately activated in memory without people's awareness or intention. This research has also shown that automatically activated information then shapes and guides people's impressions, judgments, feelings and intentions without people being aware that such influence is occurring [1–3].

Although there is now a general consensus that people's understanding of the world is automatically shaped by previous experiences and knowledge, many people assume that complex behaviors are untainted by such influences. Instead, behaviors are often presumed to result solely from conscious, intentional thought. Recent research in social psychology has placed this long-standing assumption under scrutiny by showing that complex behaviors can also be automatically initiated and guided. This represents a significant shift in the kind of effects automatic social knowledge activation has, from subjective impressions of the world to actual behaviors in the world. Such a shift is crucial for developing theories, not only about how behavioral information is represented in memory, but also about the determinants of everyday behaviors. Just as previous research has informed us that our impressions of

the world are inevitably shaped by factors outside of our awareness, the current work suggests that we might not always be aware of how we are behaving – or perhaps more importantly, why. This article first briefly describes the research on how incidental knowledge activation influences judgments and impressions, and then reviews recent findings concerning automatic effects on social behavior.

Perception automatically activates social knowledge

Social psychological research about how social knowledge is automatically activated during perception was inspired by research in cognitive psychology a quarter of a century ago [4,5]. Cognitive psychologists showed that the perception of a stimulus in the environment (e.g. a bird) activates in memory a vast array of semantically and lexically related information (e.g. robin, wings, trees, etc.). This was discovered using priming paradigms, which demonstrated that people inevitably 'go beyond the information given', inferring more information from a perceived stimulus than is physically present [6]. Furthermore, this work showed that the activation of such knowledge does not require the perceiver's intention [4,5].

Inspired by these findings, social psychologists demonstrated that *social* information is also activated in an automatic fashion (see Box 1) [1–3]. Using a variety of priming methodologies, researchers established that when a person perceives a member of a social group, such as an elderly person, information about that group is instantly activated, including attitudes, exemplars (i.e. memories of individual group members), and social stereotypes (beliefs and expectancies about the group; e.g. *elderly people are slow and forgetful*) [7–9]. The perception of behaviors themselves also leads to the activation of social knowledge. When people read about an actor performing a behavior, trait knowledge that corresponds to that behavior is spontaneously and unintentionally activated [10–12]. Taken together, this research suggests that the perception of any social stimulus will inevitably activate in memory a diverse array of related knowledge.

Incidentally activated knowledge affects social judgment

Knowledge that is incidentally activated during perception can influence people's judgments because it can guide the categorization of judgment-relevant stimuli. Social stimuli are often inherently ambiguous in that they are multiply categorizable [13]. For instance, people can be

Corresponding author: Melissa J. Ferguson (mjf44@cornell.edu).

Box 1. Automaticity in contemporary social psychology

What constitutes an automatic effect of knowledge activation on judgment or behavior? Historically, efficient processes that occur without the person's awareness, intention or control have been considered automatic [3–5,56–58]. Research that addresses whether a given process meets these criteria for automaticity, as well as speculation about how the concept of automaticity should be conceptualized, is prevalent within social psychology [1–3,56–57,59–64]. Much contemporary work on automatic processes, however, has focused on the criterion of awareness (although see research on efficient social processes [10,11]). In particular, given the well-established finding that people are unaware of the vast amount of social knowledge that becomes activated during social perception, researchers have tested the degree to which people's judgments and behavior are unknowingly influenced by such incidental knowledge activation. If participants are unaware that their behavior has been influenced by recently perceived information, they necessarily did not intend such an influence, nor could they have controlled the influence. Although this kind of operationalization of automaticity is regularly being scrutinized and refined, it does effectively capture the unintentional and non-conscious aspects of many social behaviors, the determinants of which have traditionally been assumed to be completely conscious and deliberate.

How do researchers ensure that participants are unaware of the impact of a priming episode on their judgment or behavior? The critical requirement is that participants do not suspect any influence of the priming on their subsequent behavior [65], and this can be accomplished even when participants are consciously processing the priming stimuli, as long as the cover story obscures the relation between the two. Accordingly, many researchers present priming stimuli in tasks that are ostensibly unrelated to subsequent dependent measures [66]. One common method is to use a scrambled sentence task in which prime words are embedded in sentences that participants have to unscramble as part of a 'linguistic task' [67].

At the end of an experiment, researchers carefully assess participants' suspicion by administering a 'funnel debriefing' [66]. This procedure consists of increasingly specific questions aimed at probing participants' awareness and suspicion. For example, the first question asks participants to speculate in general about the purpose of the experiment, whereas the later questions ask whether they noticed any connection between certain words in the first part of the experiment, and their answers or behaviors in the latter part of the experiment [66]. Although this type of measure might not capture those participants who were actually suspicious but do not want to admit to 'spoiling' the experimenter's plans [68], it could encourage those participants who actually were not suspicious to report nevertheless their awareness to avoid appearing gullible. Because there are possible ways in which a funnel debriefing might be either a conservative or liberal proxy of awareness, researchers are continually striving for more sensitive ways to measure the degree to which behavioral effects occur non-consciously.

judged according to their membership in any of numerous groups (e.g. race, sex, age, etc.), and social behaviors can usually be interpreted in multiple ways (e.g. is he acting in a conceited or shy manner?). Because there are always many categories into which a person or event can be placed, the ultimate classification of a stimulus will depend on the relative accessibility of the relevant categories [14].

This is when incidentally activated knowledge can determine the categorization of a stimulus, and therefore influence later judgments and interpretations. A particular category can become accessible because of the recent perception of an event, and then capture a subsequently

encountered stimulus, even if the only relation between the perceived event and the subsequent stimulus is a semantic one. For instance, a particular social category, such as African-Americans, might become activated naturally and incidentally when perceiving a member of that group in the street (or on television or in a newspaper); but that category will remain activated ('primed') for some time thereafter, even after the original stimulus is no longer present in the environment. During the time it remains active and accessible, it can influence the categorization of other, race-ambiguous people. But perhaps more importantly, because any categorization carries with it a unique set of social stereotypes, attitudes and knowledge, all of this associated knowledge (e.g. stereotypic traits, such as hostility) also remains accessible and likely to be used in the interpretation of other people's behavior. This well-established research suggests that people are not only unaware of the information that is activated during the normal course of perception, but also of the way in which such information guides their judgments and impressions of the world around them.

Incidentally activated knowledge affects behavior

Until recently, it has been largely assumed that although judgments and feelings can be shaped by factors outside of people's awareness, complex social behavior is determined by people's conscious and deliberately made choices. This assumption is part of a rich tradition of rational-choice theories of behavior as well as the humanistic tradition within psychology, both of which assume that people more or less carefully and intentionally weigh their behavioral options and then choose the optimal one [1,2].

In contrast to this assumption, researchers in social psychology have begun to demonstrate that complex behavior is also automatically shaped and guided by the knowledge that is incidentally activated during perception. Their argument builds on previous theory and research suggesting that behavioral representations can be automatically activated in memory during perception, and, once activated, can guide actual behavior.

Perception activates behavioral representations

Numerous theorists have argued that behavior is mentally represented in a similar way to other social information such as judgments and attitudes. In particular, theorists have asserted that behavioral and perceptual representations are closely interconnected in memory [15–24], and recent research supports this claim. For instance, researchers have found, in both Macaque monkeys [25] and humans [26], that the same area of the premotor cortex is active both when monkeys and humans perceive an action and when they perform that action themselves.

On the assumption that behavioral responses are mentally represented and associated with perceptual representations, behavioral responses might be among the forms of knowledge that are automatically activated in response to perceiving a social stimulus. For instance, just as a stereotype presumably becomes associated with a group after repeated group–stereotype pairings, a behavior that a person repeatedly performs in a particular situation, or in response to a particular other person,

might become associated in memory with the features of that situation or person. In both cases, the mere perception of the group member, or situation, might automatically activate the respective stereotype or behavior.

Activated behavioral information affects behavior

Assuming that behavioral responses are represented mentally and can be automatically activated during the normal course of perception, can they influence how a person behaves? There is a long history of theories arguing for this very possibility. For example, William Carpenter in the 1860s developed the principle of 'ideomotor action', in which simply thinking about an action is sufficient to lead to the performance of that action [27,28]. William James elaborated on this notion in the 1890s by asserting that the occurrence of thoughts about actions leads to the performance of those actions unless the person consciously intervenes to prevent it [29].

Much contemporary work on human mimicry suggests that in fact the perception of certain actions can lead to the performance of those actions. There is abundant evidence that people exhibit imitative behavior from an early age onwards, mimicking everything from facial expressions to the speech of their conversation partners [30–33]. This research suggests that the knowledge that is activated in response to perceiving a given action can also lead to the performance of that same action, at least for simple behaviors such as facial expressions and the use of syntax.

Recent research on automatic social behavior

Social psychologists have recently explored whether more complex social behavior is influenced by incidental knowledge activation. For example, although research has suggested that people will adopt the accent of a conversation partner [32], will a person act more aggressively if she or he perceives the trait *hostility*? As an initial attempt to test this possibility, Bargh, Chen and Burrows [16] covertly primed participants with trait knowledge about *rudeness* (Study 1), stereotypes of the elderly (and thus the trait *slowness*; Study 2), and stereotypes of African-Americans (and thus the trait *hostility*; Study 3).

Those participants primed with trait information were significantly more likely than non-primed participants to show behavior relevant to the primed trait: specifically, to interrupt another person (Study 1), walk slowly down the hallway (Study 2), or express hostility after being provoked (Study 3). Crucially, none of the participants reported any awareness of a connection between the priming episode and their behavior (see [Box 1](#)). Thus, when participants faced a situation that could be responded to with either rudeness or politeness, slow or fast walking, hostility or calmness, they acted in accordance with trait information covertly primed only minutes before in an unrelated context.

This first set of studies laid the groundwork for research that has since examined how various behaviors can be automatically guided by information that is incidentally activated from the environment. The studies over the past five years differ in terms of the source of social knowledge activation (e.g. traits, stereotypes, behavior, contexts) as

well as the nature of the behavioral effects (e.g. simple, complex).

Trait knowledge influences behavior

Dijksterhuis and van Knippenberg [21] addressed whether social behavior that is more complex than walking speed or hostility can be primed. They subtly primed participants with the trait '*intelligence*' or '*stupidity*', and then asked them to complete an ostensibly unrelated knowledge test that included questions such as 'Who painted *La Guernica*?' (a. Dali, b. Miro, c. Picasso, d. Velasquez), and 'What is the capital of Bangladesh?' (a. Dhaka, b. Hanoi, c. Yangon, d. Bangkok).

Dijksterhuis and van Knippenberg expected that priming participants with intelligence or stupidity would lead to the increased accessibility of related knowledge, including behavioral responses associated with the corresponding concept. This activated knowledge would then affect their performance on the test, relative to non-primed participants. As expected, those primed with '*intelligence*' significantly outperformed non-primed participants whereas those primed with '*stupidity*' significantly underperformed non-primed participants. None of the participants reported any awareness of a connection between the priming episode and the test. These results suggest that incidentally activated knowledge can influence even complex behavior, such as performance on a knowledge test.

Behavioral information influences behavior

Researchers have also explored whether knowledge other than trait information might influence people's behavior in an automatic fashion. Given the evidence that people tend to adopt the tone and speech of their conversation partners, researchers have examined whether people might also unknowingly mimic the actions of their conversation partners [34–38]. Several recent articles provide support for this hypothesis, and show, for example, that people are significantly more likely to shake their foot or rub their face unconsciously if their conversation partner is doing so than if their partner is not [19]. In all of these studies, participants were carefully questioned after the experiment to assess their awareness of their own and their partner's behaviors. Participants did not report any awareness of their own behavior, their partner's behavior, or any relation between the two. This research suggests that the mere perception of actions automatically increases the likelihood of the performance of those same actions, without the person's intention or awareness.

Recent work has expanded upon this topic by showing that the perception of behaviors does not always increase the likelihood of performing those same behaviors. Tiedens and Fragale [39] hypothesized that the perception of behaviors that connote high or low status might non-consciously lead to the adoption of the opposite (i.e. low or high status, respectively) behaviors. The findings suggest that when participants interacted with a partner whose posture suggested dominance (i.e. an expansive posture), the participants themselves non-consciously adopted

submissive postures (i.e. restricted). A sensitive probing process at the end of these experiments indicated that participants were not aware of their own posture, their partner's posture, or any connection between the two. Thus, the perception of another's behavior can unintentionally and unknowingly lead to the performance of either that same behavior, or one that is diametrically opposed in terms of the socially relevant dimension of status.

Goal-relevant information influences behavior

In addition to investigating the kinds of information that can influence social behavior, researchers have also explored the type of behavior that can result from such an influence [40–43]. Recent research by Bargh *et al.* [42] suggests that incidental social perception also activates goal knowledge that can automatically influence actual goal-pursuit – that is, behavior that is directed towards an objective, persists over time, and resumes after an interruption.

Across several studies, participants were covertly primed with words related to *achievement*, and then completed a series of word-search puzzles. Not only did primed participants perform significantly better than non-primed participants during the same time period, they were more likely than non-primed participants to maximize their performance by disobeying experimenter instructions to stop working on the task. Primed participants were also significantly more likely than non-primed participants to choose to continue working on the puzzles after an interruption rather than begin a cartoon-assessment task that had been rated in another study as more enjoyable. As in other experiments in this area of research, none of the participants in any of the studies reported any awareness of a connection between the priming tasks and

the dependent measures. This type of research can potentially extend the effects of incidental knowledge activation on behavior from relatively static displays of a trait-consistent action, to complex, feedback-dependent sequences of behaviors.

Context information influences behavior

Researchers have also investigated whether the perception of social settings might also influence behavior in a similar fashion. Aarts and Dijksterhuis [44] used as priming stimuli locations that were associated with situational norms (i.e. prescriptions for acceptable behavior within a certain situation). For example, some participants were primed with stimuli related to libraries, a location for which the norm is quiet behavior. Those who were primed with the location and who had the goal to visit the location later behaved in ways that were consistent with the norm for that location. For instance, those primed with library subsequently recited a text passage in a significantly softer voice than non-primed participants. Again, none of the participants reported any awareness of a connection between the priming procedure and the subsequent dependent measures.

As another example of research that shows how context information inadvertently influences behavior, researchers have examined whether participants who are primed with crowded group-settings display different amounts of helping behavior compared with non-primed participants. Given the well-established finding in social psychology that people in a crowd exhibit less helping behavior than people who are alone [45], Garcia *et al.* [46] tested whether the incidental activation of knowledge about being in a large group might automatically influence later, ostensibly unrelated helping behavior. They asked participants either to imagine themselves in a group, or alone (e.g. in a crowded or empty movie theater) and then measured their willingness in a variety of helping behaviors, such as donating money to charity. Those who imagined themselves in a group context later exhibited significantly less helping behavior than control participants. Great care was taken across five studies to ensure that participants did not suspect any connection between the priming task and the helping measure, and indeed, none of the participants reported any suspicion. These studies suggest that behavioral information can be activated from the mere perception of social settings or contexts (such as a library, or a crowded movie theater) and subsequently influence actual behavior in the absence of people's intentions and awareness.

Parameters of the effect of social perception on behavior

A crucial question concerns the mechanisms that might underlie such automatic effects on behavior, and researchers have identified both some boundary conditions as well as some potential mechanisms [15,47–50]. For example, Dijksterhuis and colleagues [49,50] have explored how the concreteness of the priming stimuli influences the nature of the effect, by priming participants with trait information either via social groups (e.g. the group *professors* activates the trait *intelligence*) or via exemplars of those social groups (e.g. *Albert Einstein* also primes the trait

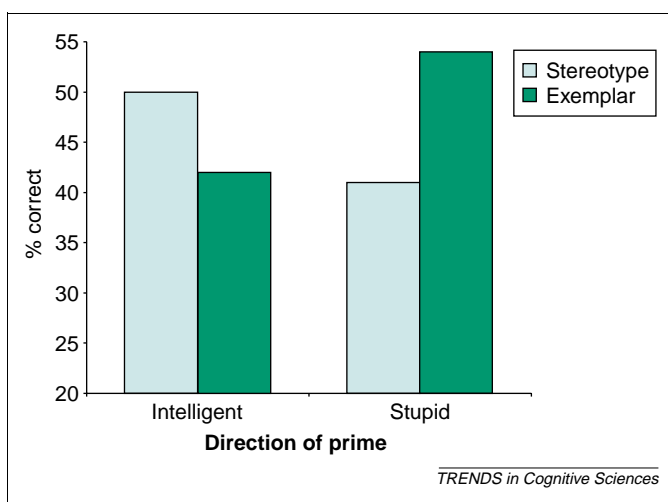


Figure 1. Percentage correct on a general knowledge test as a function of the type (stereotype or exemplar) and direction (intelligence or stupidity) of the primes. Participants were covertly primed with a stereotype indicating intelligence (*professors*) versus stupidity (*supermodels*), or an exemplar indicating intelligence (*Albert Einstein*) versus stupidity (*Claudia Schiffer*). A significant interaction between the type and direction of primes on percentage correct emerged, such that whereas stereotype primes led to assimilation effects (participants' behavior was in accord with the direction of the prime), exemplar primes led to contrast effects (participants' behavior was in contrast with the direction of the prime). In other words, whereas those primed with professors significantly outperformed those primed with supermodels, those primed with Albert Einstein significantly underperformed those primed with Claudia Schiffer. Adapted from [50].

intelligence). In line with findings from the social judgment literature [51–53], those participants primed with a social group (i.e. abstract information) exhibited behavior in line with traits associated with the group (i.e. assimilative effects), but those primed with exemplars from the group (i.e. relatively more concrete information) exhibited behavior in contrast with the associated trait (i.e. contrast effects; see Figure 1).

Researchers have argued that whereas the perception of an abstract prime activates an interpretive frame that is used to interpret subsequent stimuli, the perception of concrete exemplars invokes comparative processes whereby the exemplar anchors the dimension of judgment along which subsequent stimuli are judged. When the exemplars are extreme, most subsequently perceived (or in this case, performed) behaviors will be positioned away from the exemplar. Dijksterhuis and colleagues [49] argued that contrast effects emerge in behavior because participants implicitly compare themselves with the primed exemplar and then act accordingly.

As one might expect, the magnitude of the priming effect on behavior has been found to depend upon the strength of association in memory between the prime material (e.g. the social group, context, trait, stereotype) and the particular behavior. Dijksterhuis and colleagues [54] predicted that the effect of priming participants with ‘elderly people’ on later memory performance would be contingent on how much contact participants previously had with the elderly. As expected, those participants with lots of previous contact with the elderly performed significantly worse on a memory test after being covertly primed with the group (this was expected because poor memory is part of the elderly stereotype). However, those with little previous contact did not show any priming effect, suggesting that the degree to which incidental

Box 2. Questions for future research

- What types of activated knowledge mediate effects on behavior? For example, assuming that the mere perception of a stimulus activates trait, context, goal, affective and behavioral information, which types of knowledge mediate the variety of effects shown in this recent research?
- To what degree do priming effects on complex behavior meet the traditional four criteria for automaticity? For example, to what extent does participant suspicion of a relation between the priming episode and the dependent measures qualify as an ‘automatic’ priming effect on behavior? What cognitive capacity is required for these effects to occur?
- What are the necessary preconditions for incidental acts of social perception to influence relatively static displays of behavior (e.g. walking slowly), and how do these differ (if at all) from the conditions needed to influence more complex and feedback-dependent sequences of behavior (e.g. the attempt to achieve across multiple tasks and interruptions)?
- What is the magnitude and duration of these types of priming effects, and what factors moderate these variables?
- What sources of knowledge affect behavior in an automatic fashion, beyond those that have been studied so far?
- To what extent do priming effects on various sorts of complex behavior occur in real-life situations (i.e. outside the laboratory)?

knowledge activation increases the likelihood of performing an associated behavior depends on the presence and strength of that association in memory. Presumably, the belief about the elderly having poor memory was reinforced in those who interacted frequently with members of the group.

Researchers have also recently examined whether the effect on later behavior of being primed with a social group is mediated by the activation of traits associated with that group. Kawakami *et al.* [55] tested whether the effect of being primed with *elderly* on response speed in a lexical-decision task depended on the activation of the trait *slow* (see Figure 2). The findings showed a priming effect on behavior, as primed participants exhibited a significantly slower response speed overall compared with non-primed participants. In addition, primed participants responded significantly faster to stereotype-consistent (e.g. *slow*) than to inconsistent traits, compared with non-primed participants, who showed no difference, suggesting that the stereotyped traits were activated in memory, as expected. Most importantly, however, the effect of priming on behavior (overall slowness of responses) was independent of the effect of priming on stereotype trait activation. This suggests that the perception of a stimulus activates a diverse array of knowledge (e.g. behaviors, traits, exemplars), and that types of knowledge can have independent effects on subsequent behavior.

Conclusions

Over the past five years, researchers in experimental social psychology have demonstrated not only that people’s judgments and attitudes are sometimes automatically influenced by factors outside of their awareness, but that their actual behaviors are as well. Given the inherent ambiguity in social stimuli and situations, and thus the range of behavioral responses that might be appropriate for any given situation, it seems likely that people’s

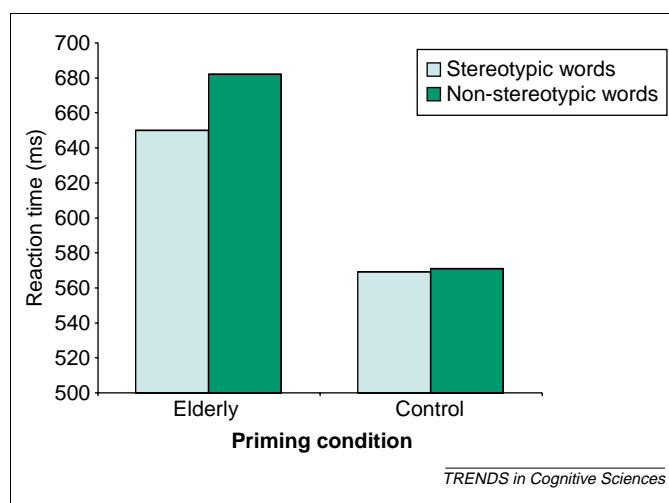


Figure 2. Reaction time to words in a lexical-decision task as a function of priming condition (elderly vs. non-primed control) and type of target words (stereotypic of the elderly vs. non-stereotypic of the elderly). The results suggest a priming effect on behavior such that primed participants responded significantly more slowly overall than non-primed participants. They also suggest a priming effect on stereotype activation such that primed participants responded significantly faster to stereotypic than to non-stereotypic words, whereas non-primed participants showed no difference. Importantly, a mediational analysis demonstrated that the effect of priming on overall response speed was independent of the effect on stereotype activation, suggesting that behavioral effects are not necessarily mediated by the activation of group-relevant traits. Adapted from [55].

behavior is often shaped and guided in part by knowledge that has become accessible through incidental means, such as unrelated recent experiences. This suggests that, in contrast to the assumption that we always consciously decide how to behave, we might routinely be unaware of some or even many of the determinants of our behavior.

Future research in this area will increasingly focus on the mechanisms that underlie the apparent potential independence of conscious intention and actual behavior (see Box 2). Not only will this research identify boundary conditions and mediators of such effects, it is likely to uncover a variety of neural substrates that underlie or enable the effects. For example, there is emerging evidence from cognitive neuroscience that points to fundamental dissociations in the human brain between those structures that are responsible for guiding complex motor behavior, and those that afford conscious access to our current intentions and purposes [15]. As researchers gather more information about the nature of these non-conscious effects, we may begin to understand more fully the phenomenon of behavior without intention.

References

- 1 Bargh, J.A. and Chartrand, T. (1999) The unbearable automaticity of being. *Am. Psychol.* 54, 462–479
- 2 Bargh, J.A. and Ferguson, M.J. (2000) Beyond behaviorism: on the automaticity of higher mental processes. *Psychol. Bull.* 126, 925–945
- 3 Gazzaniga, M.S. and Heatherton, T.F. (2003) *The Psychological Science: Mind, Brain, and Behavior*, W.W. Norton
- 4 Neely, J.H. (1977) Semantic priming and retrieval from lexical memory: rules of inhibitionless spreading activation and limited-capacity attention. *J. Exp. Psychol. Gen.* 106, 226–254
- 5 Posner, M.I. and Snyder, C.R.R. (1975) Attention and cognitive control. In *Information Processing and Cognition: The Loyola Symposium* (Solso, R.L., ed.), Erlbaum
- 6 Bruner, J.S. (1957) On perceptual readiness. *Psychol. Rev.* 64, 123–152
- 7 Fazio, R.H. et al. (1995) Variability in automatic activation as an unobtrusive measure of racial attitudes: a *bona fide* pipeline? *J. Pers. Soc. Psychol.* 69, 1013–1027
- 8 Smith, E.R. and Zarate, M.A. (1992) Exemplar-based model of social judgment. *Psychol. Rev.* 99, 3–21
- 9 Blair, I. and Banaji, M. (1996) Automatic and controlled processes in stereotype priming. *J. Pers. Soc. Psychol.* 70, 1142–1163
- 10 Todorov, A. and Uleman, J.S. The automaticity of binding spontaneous trait inferences to actors' faces. *J. Exp. Soc. Psychol.* (in press)
- 11 Todorov, A. and Uleman, J.S. (2002) Spontaneous trait inferences are bound to actors' faces: evidence from a false recognition paradigm. *J. Pers. Soc. Psychol.* 83, 1051–1065
- 12 Uleman, J.S. (1999) Spontaneous versus intentional inferences in impression formation. In *Dual-Process Theories in Social Psychology* (Chaiken, S. and Trope, Y., eds), pp. 141–160, Guilford Press
- 13 Bodenhausen, G.V. and Macrae, C.N. (1998) Stereotype activation and inhibition. In *Advances in Social Cognition* (Vol. 11) (Wyer, R.S., ed.), pp. 1–52, Erlbaum
- 14 Higgins, E.T. (1996) Knowledge activation: accessibility, applicability, and salience. In *Social Psychology: Handbook of Basic Principles* (Higgins, E.T. and Kruglanski, A.W., eds), pp. 133–168, Guilford Press
- 15 Bargh, J.A. (2003) Bypassing the will: towards demystifying the nonconscious control of social behavior. In *The New Unconscious* (Hassin, R. et al., eds), pp. 111–222, Oxford University Press (in press)
- 16 Bargh, J.A. et al. (1996) Automaticity of social behavior: direct effects of trait construct and stereotype priming on action. *J. Pers. Soc. Psychol.* 71, 230–244
- 17 Berkowitz, L. (1984) Some effects of thoughts on anti- and prosocial influences of media events: A cognitive-neoassociation analysis. *Psychol. Bull.* 95, 410–427
- 18 Berkowitz, L. (1997) Some thoughts extending Bargh's argument. In *Advances in Social Cognition* (Vol. 10) (Wyer, R.S., ed.), pp. 83–94, Erlbaum
- 19 Chartrand, T.L. and Bargh, J.A. (1999) The chameleon effect: the perception-behavior link and social interaction. *J. Pers. Soc. Psychol.* 76, 893–910
- 20 Dijksterhuis, A. and Bargh, J.A. (2001) The perception-behavior expressway: automatic effects of social perception on social behavior. In *Advances in Experimental Social Psychology* (Vol. 33) (Zanna, M.P., ed.), pp. 1–40, Academic Press
- 21 Dijksterhuis, A. and van Knippenberg, A. (1998) Automatic social behavior or how to win a game of trivial pursuit. *J. Pers. Soc. Psychol.* 74, 865–877
- 22 Prinz, W. (1990) A common coding approach to perception and action. In *Relationships Between Perception and Action* (Neumann, O. and Prinz, W., eds), pp. 167–201, Springer-Verlag
- 23 Vallacher, R.R. (1993) Mental calibration: forging a working relationship between mind and action. In *Handbook of Mental Control* (Wegner, D.M. and Pennebaker, J.W., eds), pp. 443–472, Englewood Cliffs, Prentice Hall
- 24 Woody, E. and Sadler, P. (1998) On reintegrating dissociated theories: comment on Kirsch and Lynn (1998). *Psychol. Bull.* 123, 192–197
- 25 Rizzolatti, G. and Arbib, M.A. (1998) Language within our grasp. *Trends Neurosci.* 21, 188–194
- 26 Buccino, G. et al. (2001) Action observation activates premotor and parietal areas in somatotopic manner: an fMRI study. *Eur. J. Neurosci.* 13, 400–404
- 27 Carpenter, W.B. (1888) *Principles of Mental Physiology*, Appleton
- 28 Wegner, D.M. (2002) *The Illusion of Conscious Will*, MIT Press
- 29 James, W. (1890) *The Principles of Psychology* (Vol. 2), Holt
- 30 Bock, J.K. (1986) Syntactic persistence in language production. *Cogn. Psychol.* 18, 355–387
- 31 Bock, J.K. (1989) Closed-class immanence in sentence production. *Cognition* 31, 163–186
- 32 Dell, G.S. (1986) A spreading activation theory of retrieval in sentence production. *Psychol. Rev.* 93, 283–321
- 33 Smeets, J.B.J. and Brenner, E. (1995) Perception and action are based on the same visual information: distinction between position and velocity. *J. Exp. Psychol. Hum. Percept. Perform.* 21, 19–31
- 34 Chartrand, T.L. et al. (2003) Beyond the perception-behavior link: the ubiquitous utility and motivational moderators of nonconscious mimicry. In *Unintended Thought II: The New Unconscious*, (Hassin, R. et al., eds), Oxford University Press (in press)
- 35 Cheng, C.M. and Chartrand, T.L. Self-monitoring without awareness: using mimicry as a nonconscious affiliation strategy. *J. Pers. Soc. Psychol.* (in press)
- 36 van Baaren, R.B. et al. Mimicry for money: behavioral consequences of imitation. *J. Exp. Soc. Psychol.* (in press)
- 37 van Baaren, R.B. et al. Mimicry and pro-social behavior. *Psychol. Sci.* (in press)
- 38 van Baaren, R. et al. The forest, the trees, and the chameleon: context dependency and nonconscious mimicry. *J. Pers. Soc. Psychol.* (in press)
- 39 Tiedens, L.Z. and Fragale, A.R. (2003) Power moves: complementarity in dominant and submissive nonverbal behavior. *J. Pers. Soc. Psychol.* 84, 558–568
- 40 Aarts, H. and Dijksterhuis, A. (2000) Habits as knowledge structures: automaticity in goal-directed behavior. *J. Pers. Soc. Psychol.* 78, 53–63
- 41 Bargh, J.A. (1990) Auto-motives: preconscious determinants of social thought and behavior. In *Handbook of Motivation and Cognition* (Vol. 2) (Higgins, E.T. and Sorrentino, R.M., eds), pp. 93–130, Guilford Press
- 42 Bargh, J.A. et al. (2001) The automated will: nonconscious activation and pursuit of behavioral goals. *J. Pers. Soc. Psychol.* 81, 1014–1027
- 43 Fitzsimons, G.M. and Bargh, J.A. (2003) Thinking of you: nonconscious pursuit of interpersonal goals associated with relationship partners. *J. Pers. Soc. Psychol.* 84, 148–163
- 44 Aarts, H. and Dijksterhuis, A. (2003) The silence of the library: environment, situational norm, and social behavior. *J. Pers. Soc. Psychol.* 84, 18–28
- 45 Latane, B. and Darley, J.M. (1968) Group inhibition of bystander intervention. *J. Pers. Soc. Psychol.* 10, 215–221
- 46 Garcia, S.M. et al. (2002) Crowded minds: the implicit bystander effect. *J. Pers. Soc. Psychol.* 83, 843–853
- 47 Dijksterhuis, A. et al. (2000) Of men and mackerels: attention,

- subjective experience, and automatic social behavior. In *The Message Within: The Role of Subjective Experience in Social Cognition and Behavior* (Bless, H. and Forgas, J.P., eds), pp. 37–51, Psychology Press
- 48 Dijksterhuis, A. and Bargh, J.A. (2001) The perception-behavior expressway: automatic effects of social perception on social behavior. In *Advances in Experimental Social Psychology* (Vol. 33) (Zanna, M., ed.), pp. 1–40, Academic Press
- 49 Stapel, D.A. and Koomen, W. (1999) Seeing one thing and doing another: contrast effects in automatic behavior. *J. Pers. Soc. Psychol.* 75, 862–871
- 50 Dijksterhuis, A. et al. (2001) Reflecting and deflecting stereotypes: assimilation and contrast in impression formation and automatic behavior. *J. Exp. Soc. Psychol.* 37, 286–299
- 51 Moskowitz, G.B. and Skurnik, I.W. (1999) Contrast effects as determined by the type of prime: trait versus exemplar primes initiate processing strategies that differ in how accessible constructs are used. *J. Pers. Soc. Psychol.* 76, 911–927
- 52 Stapel, D.A. and Koomen, W. (2001) The impact of interpretation versus comparison mindsets on knowledge accessibility effects. *J. Exp. Soc. Psychol.* 37, 134–149
- 53 Stapel, D.A. and Koomen, W. (2000) How far do we go beyond the information given? The impact of knowledge activation on interpretation and inference. *J. Pers. Soc. Psychol.* 78, 19–37
- 54 Dijksterhuis, A. et al. (2000) On the relation between associative strength and automatic behavior. *J. Exp. Soc. Psychol.* 36, 531–544
- 55 Kawakami, K. et al. (2002) Automatic stereotyping: category, trait, and behavioral activations. *Pers. Soc. Psychol. Bull.* 28, 3–15
- 56 Bargh, J.A. (1989) Conditional automaticity: varieties of automatic influence in social perception and cognition. In *Unintended Thought* (Uleman, J.S. and Bargh, J.A., eds), pp. 3–51, Guilford Press
- 57 Bargh, J.A. (1994) The four horsemen of automaticity: awareness, intention, efficiency, and control in social cognition. In *Handbook of Social Cognition* (Vol. 1) (Wyer, R.S. and Srull, T.K., eds), pp. 1–40, Erlbaum
- 58 Barsalou, L.W. (1992) *Cognitive Psychology: An Overview for Cognitive Scientists*, Erlbaum
- 59 Bargh, J.A. (1996) Automaticity in social psychology. In *Social Psychology: Handbook of Basic Principles* (Higgins, E.T. and Kruglanski, A.W., eds), pp. 169–183, Guilford Press
- 60 Bargh, J.A. (1997) The automaticity of everyday life. In *Advances in Social Cognition* (Vol. 10) (Wyer, R.S., ed.), pp. 1–61, Erlbaum
- 61 Chaiken, S. and Trope, Y. (1999) *Dual-Process Theories in Social Psychology*, Guilford Press
- 62 Hassin, R. et al. *The New Unconscious*, Oxford University Press (in press)
- 63 Wegner, D. and Bargh, J.A. (1998) Control and automaticity in social life. In *The Handbook of Social Psychology* (Vol. 1) (Gilbert, D.T. and Fiske, S.T., eds), pp. 446–496, McGraw-Hill
- 64 Wegner, D.M. (1994) Ironic processes of mental control. *Psychol. Rev.* 101, 34–52
- 65 Bargh, J.A. (1992) Does subliminality matter to social psychology? Awareness of the stimulus versus awareness of its influence. In *Perception Without Awareness: Cognitive, Clinical, and Social Perspectives* (Bornstein, R.F. and Pittman, T.S., eds), pp. 236–255, Guilford Press
- 66 Bargh, J.A. and Chartrand, T.L. (2000) The mind in the middle: a practical guide to priming and automaticity research. In *Handbook of Research Methods in Social and Personality Psychology* (Reis, H.T. and Judd, C.M., eds), pp. 253–285, Cambridge University Press
- 67 Srull, T.K. and Wyer, R.S. Jr (1979) The role of category accessibility in the interpretation of information about persons: some determinants and implications. *J. Pers. Soc. Psychol.* 37, 1660–1672
- 68 Orne, M.T. (1962) On the social psychology of the psychological experiment: with particular reference to demand characteristics and their implications. *Am. Psychol.* 17, 776–783

Low-cost access to *TICS* for developing countries World Health Organisation initiative

<http://www.healthinternet.net>

The World Health Organisation and six medical journal publishers, including Elsevier, have launched the **Health Internetwork Access to Research** (HINARI) initiative, which enables ~70 developing countries to gain free access to biomedical literature through the Internet.

The science publishers were approached by the WHO and the British Medical Journal in 2001. The aim of *Health InterNetwork* is to bring together public and private partners under the principle of ensuring equitable access to health and biomedical information.

More than 2000 science publications, including *TICS* and the other Trends journals, are now available free or at significantly reduced prices to universities, medical schools, research and public institutions in developing countries. Worldwide, 113 countries are eligible to join the *Health Internetwork*. Registered users have full-text access to the journal collection, as well as databases, encyclopedias, books, compendia and other full-text resources.

Gro Harlem Brundtland, director-general for the WHO, said that this initiative was '*perhaps the biggest step ever taken towards reducing the health information gap between rich and poor countries*'.