The Ecology of Automaticity: Toward Establishing the Conditions Needed to Produce Automatic Processing Effects
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The ecology of automaticity: Toward establishing the conditions needed to produce automatic processing effects

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In the past 15 years, the single term *automatic* has been applied to a diversity of laboratory phenomena that differ as to the preconditions necessary for their occurrence. Several major strains of automaticity are distinguished, based on the experimental conditions under which they are obtained: *preconscious* automatic processes, requiring only the proximal stimulus event; *postconscious* automatic processes, similar to preconscious effects but needing a recent activation or "priming" event for their operation; and *goal-dependent* automatic processes, which occur only when a specific, intentional processing goal is in place. It is argued that to more accurately specify the conditions under which an automatic effect will occur in the natural environment, greater attention needs to be given to aspects of the experimental paradigm (e.g., subjects' task goal, questionnaire administrations, previous tasks) that might be necessary to produce the effect.

> Otto is an area manager of a large industrial concern and has just been transferred to a new city. Having arrived a few days early, he decided to drive around to familiarize himself with the area. In the course of his exploration he headed out of town along a scenic river road. Otto was enjoying the scenery when, on rounding a turn in the road, a major intersection loomed in front of him. He only saw the stop sign just in time, and his foot immediately shot out and stomped on the brake. His heart raced as he watched a semitrailer truck whiz by on the busy highway, mere yards from where his car had screeched to a halt.
>
> On a beautiful Saturday morning about a month later, Otto went out for a long walk. On the way out of his downtown apartment he remembered the river road, about a half-mile away. After an hour or so he once again rounded the turn just prior to the busy highway intersection and came upon the same stop sign and heavy traffic he had encountered that first day. A rueful smile crossed his face as he gazed at the intersection, remembering his close call.

The reader will no doubt be surprised to learn that the above story was not culled from the annals of great literature. However, the story

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is intended to illustrate what I would like to argue is a fundamental characteristic of automatic information processing: its conditional nature. Note that the first time Otto encountered the stop sign his foot kicked out at the brake pedal immediately, spontaneously, and without any deliberate, conscious intention to do so. It was the habitual reaction all experienced automobile drivers have in response to a red traffic light or stop sign. In Otto's case it probably saved his life because there was no time available for a relatively slower controlled decision process to occur and instigate the braking response.

Otto's reaction to the stop sign the second time he encountered it was very different. His leg did not automatically kick out to the left to push a nonexistent brake pedal upon the perception of the stop sign—fortunately for other pedestrians within range at the time! Clearly the braking response when he was driving required *both* the triggering stop sign stimulus and the operative goal of driving a car; that is, it was *conditional* on having a certain information-processing goal in place.

The Monolithic Concept of Automaticity

Originally, an *automatic* process was defined as being involuntary, unintentional, autonomous, occurring outside of awareness, and effortless (not using any of the limited processing capacity). In other words, it could occur without the need of an act of will, without the individual's awareness of its commencement or operation, and without interfering with other, concurrent processes (see LaBerge & Samuels, 1974; Posner & Snyder, 1975; Shiffrin & Schneider, 1977). What are termed *conscious* or *controlled* processes, in contradistinction, were initially defined as under intentional control, flexible in response to novel or unexpected environmental conditions, with the individual aware of their occurrence, effortful, and limited by the availability of processing resources (see Atkinson & Shiffrin, 1968; Logan, 1980; Neely, 1977; Shallice, 1972).

Today, the consensual view of automaticity continues to be a unitary one: It possesses all of these defining features in an all-or-none fashion (see Johnson & Hasher, 1987; Kahneman & Treisman, 1984; Logan & Cowan, 1984). Any single cognitive process is therefore either automatic or controlled, under this definition, and between them the two types exhaust the universe of possible cognitive processes. Under this dual-mode model of cognition, then, any single cognitive process could be classified as *either* controlled or automatic—possessing all of the features of one and none of the other.

The problem with the unitary, all-or-none definitions of automaticity and controlled processing is that they have been repeatedly disconfirmed empirically over the past 10 years. The defining features just do not hang together in an all-or-none fashion, but rather seem to be able to co-occur in just about any combination (see reviews by Bargh, 1989; Kahneman & Treisman, 1984; Logan & Cowan, 1984; Zbrodoff & Logan, 1986). Take the Stroop color-word interference effect, for example, in which the subject does not intend and cannot control the interference caused by the meaning of the stimulus word. This interference effect (i.e., the automatic processing of the word's meaning) does not occur without the devotion of spatial attention to the word's location (Kahneman & Henik, 1981; Kahneman & Treisman, 1984). When spatial attention to the stimulus location is disrupted in any of a variety of ways, the Stroop effect disappears. And other processes believed to be classic exemplars of automatic processing effects, such as well-practiced visual target detection, semantic priming, and spreading activation effects, have been demonstrated both to require some attentional resources to occur and not to occur given certain processing goals on the part of the subject (e.g., Dark, Johnston, Myles-Worsley, & Farah, 1985; Hoffman & MacMillan, 1985; Ogden, Martin, & Paap, 1980).

In addition to these empirical demonstrations, the mutually exclusive conceptualization of automatic and controlled processing has run into logical difficulties. Logan and Cowan (1984) have noted that nearly all of the common, mundane examples of automatic processes—such as reading, driving, walking, and typing—are in truth highly controlled. One must intend to engage in any of these activities, and one can stop them whenever one wants. Also, the individual is usually aware of engaging in the activity, even though such routine action sequences do not require active attention (i.e., they are autonomous). These well-learned activities do not fall neatly into one classification or the other: They are intentional but autonomous; they are quite efficient (minimally demanding of processing resources), but one is aware of them. And they are controllable; as in our opening example of Otto, the automated responses that characterize driving, typing, and so on do not occur without the overarching goal to engage in the activity.

Intention, Awareness, Attention, and Control as Independent Qualities

Therefore, the four defining features—*attention-demanding* (vs. highly efficient), *awareness* (vs. phenomenally outside of awareness), *intentional* (vs. unintentional), and *control* (vs. uncontrollable)—do not co-occur perfectly, or even usually, but instead are relatively independent qualities. I would claim further that one can come up with an example fitting any random combination of the features: Match a penny, nickel, dime, and quarter to the four dimensions, let "heads" designate the controlled processing feature (no metaphorical pun intended), and flip away. Examples for several of these 16 combinations have already been given above (see Treisman, Vieira, & Hayes, this issue, for a discussion of phenomena best fitting the pure case of automaticity; see Bargh, 1989, for empirical findings fitting most other combinations).

For the sake of illustration, let me create a combination for which an example might seem difficult to come by. Let us say that my coin-flipping leads me to come up with an instance of a process that (a) one is aware of, (b) is efficient, and (c) is controlled, but nonetheless one that (d) the individual did not intend to occur. There is a case corresponding to this combination of qualities: the "action slips" discussed by Norman (1981) and Heckhausen and Beckmann (1990). These are complex actions that people are aware of performing but which they did not intend to perform—and yet, at some level they are certainly controlling the action. A famous example of such an action slip was given by James (1890) in recounting the tale of the man sent upstairs by his wife to change for dinner and found by her an hour later (upon the arrival of the evening's guests) in bed asleep.

Shiffrin and Schneider (1977) warned about the dangers of treating the complex processing tasks typical of the nonlaboratory environment as if they were uniformly automatic and controlled. Instead, they noted that any processing task of sufficient interest to psychologists to study would certainly be complex enough to be comprised of both automatic and controlled components. This is certainly the case with the examples I have used so far. Driving, for instance, has an abstract controlled component (the overarching goal to get somewhere) as well as many automated subroutines used to maneuver the car safely. It is also certainly the case with nearly all phenomena of interest to researchers of social cognition, such as stereotyping, impression formation, and attribution.

Studies of automaticity in impression formation and social judgment, for example, have demonstrated that people are able to make these judgments very efficiently, even when engaged in an attention-demanding secondary task (e.g., Bargh & Thein, 1985; Bargh & Tota, 1988; Gilbert & Krull, 1988; Gilbert, Pelham, & Krull, 1988; Smith & Lerner, 1986). The relative independence of these judgment processes from the availability of attentional resources has led to the claim that they are relatively automatic. However, in these studies, subjects uniformly were instructed to form an impression of or to make a specific judgment about the target; it was not the case that subjects made these cognitive responses unintentionally, or were not aware of doing so, or could not help themselves from doing so.

Automaticity by Default

Yet, because of the underlying assumption that the defining features of automaticity monolithically co-occur, in practice the finding that one of these features characterizes a given social-cognitive process has been sufficient for it to be labeled "automatic"—and therefore possessing all of the defining qualities. This "automaticity by default" has led to no small confusion and muddying of the waters (see Bargh, 1989, pp. 4–7; see also Anderson, this issue). Worse, it is potentially dangerous, in that those who make social policies and legal decisions are consumers of research on stereotyping and causal attribution, and misleading claims of the "automaticity" of such processes might well have serious consequences (Fiske, 1989). For instance, evidence of the efficiency of stereotypic processing, and the consequent labeling of stereotyping as automatic, might be used in a discrimination lawsuit, with the defense raised that the defendant did not intend, was not aware of, and could not control his or her discriminatory behavior, and so is not culpable.

It is clear from this example that the extent to which a process occurs unintentionally is of great interest in and of itself. So too, for other reasons, are questions of whether a process occurs outside of conscious awareness (see Bornstein & Pittman, in press), whether it occurs despite a concurrent load on limited attentional resources (see Bargh & Thein, 1985), and can be controlled if desired (Devine, 1989). As already discussed, there is ample empirical evidence that the component properties of automaticity in processing tasks of "real-world" complexity do not co-occur as a package; moreover, there are no good theoretical reasons to believe in the unitary definition either (see Zbrodoff & Logan, 1986). Why not then study these features separately, given they are important in their own right, and for differing reasons?

Let us return to the example of stereotyping and discrimination. Considerable research has shown the activation of stereotypic representations to be unintended, efficient, and outside the awareness of the perceiver, requiring only the presence of the identifying features of the group (e.g., Brewer, 1988; Deaux & Lewis, 1984; Mills &

Tyrrell, 1983; Pratto & Bargh, 1991).[1] Does this mean as well that stereotyping is uncontrollable? To the contrary, Fiske (e.g., 1989) has shown that given appropriate motivational inducements (for example, that one must explain the reasons behind one's judgment later on), subjects base their judgments on individuating features of the target and less so on stored stereotypic knowledge about the target's group. Devine (1989) demonstrated both the automatic activation of racial stereotypes and the ability of subjects to control the influence of the stereotype on judgments—*if* the subject held the value of not being prejudiced.

The important point for present purposes is that both Fiske and Devine questioned the implicit assumption that an efficient, unintentional process was also, necessarily, uncontrollable. In doing so, they provided yet further evidence against the unitary definition of automaticity. But more important, their research demonstrates how absolutely essential it is to treat intentionality, efficiency, awareness, and control as separate and orthogonal qualities of a cognitive process. Otherwise, we may well mislead other researchers as well as lay consumers of our work.

Do the above arguments condemn the label "automatic" to oblivion? Only if one insists on the unitary definition (the pure case of automaticity that "preattentive" already handles quite well; see Treisman et al., 1992). When I attempted to classify, in terms of how many of the four original defining features were in place, the great variety of phenomena to which the term automatic had been applied (Bargh, 1989, Table 1.1), the one characteristic true of all phenomena was *autonomy*—that the process, once started, did not require conscious guidance to run to completion. Logan and Cowan (1984) termed such processes "ballistic." This appears to be the core of the concept for cognitive psychologists—that once the process is put in motion (and this could be by an intentional choice or by a triggering stimulus in the environment; see below), it runs off by itself without the need of conscious monitoring.

Conditional Automaticity: *IF(x,y,z)→THEN(autonomous process)*

Taking this core definition of automaticity as a starting point, one can take any phenomenon that includes such an automatic component and analyze it in terms of its triggering conditions—in other words, what is needed to have the (then) automatic process occur. We could then classify varieties of automaticity in terms of their necessary preconditions: Does a process require attentional resources in sufficient quantities that it cannot occur if attentional effort is devoted elsewhere at the time? Does the process require one's intention or goal that it occur? Does it occur involuntarily? Is the individual aware of its occurring, and so perhaps is able to control it, or is he or she unaware of it and so not likely to control it?

Why would we want to classify automatic processes in this way? For one thing, so that we avoid miscommunicating our beliefs about whether the phenomenon we are studying is unintentional, efficient, controllable, and so on. Second, if we routinely classified processes in terms of which of the several features we have evidence for, and which we do not, it would leave open the questions of whether those nonmanipulated features are necessary for the effect to occur. Third, knowledge of the necessary conditions for the effect is essential if we are to accurately generalize our findings from the laboratory to the "real world." One cannot give subjects the goal of detecting a visual target, for example, show that eventually they can do so relatively effortlessly, and assume that the effect would occur in the absence of the goal. In terms of Treisman et al.'s (1992) research demonstrating the context-bound nature of preattentive processes, the processing goal might well be an important feature of the traces that are laid down, such that in the absence of the goal the effect might not occur (see also Logan, 1988). The example of Otto's reaction to the stop sign when driving versus walking was intended to serve as another illustration of the goal dependence of many automatic processing effects; other examples from social cognition research will be offered below.

Therein lies the danger of assuming implicitly the presence of an automatic feature given the presence of other automatic feature(s)—one might well be wrong. Such was the case with the presumption that stereotype influences on social judgment were uncontrollable. But there are many other automatic effects that may have hidden preconditions due to the experimental procedures used, as will be seen in the next section.

In the section that follows, three major forms of automaticity will be distinguished, classified according to what is necessary for their occurrence.[2] The approach taken here is kindred in spirit to that of Anderson's concept of production rules (1983, 1992), in that the automatic component corresponds to the *THEN* clause of a rule, and the necessary preconditions to the *IF* clause. For example, *IF*(proximal social behavioral stimuli)→*THEN*(social judgment formed and stored) would qualify as a "preconscious" automaticity, whereas *IF*(goal to form impression + proximal social behavioral stimuli)→*THEN*(social judgment) would be an example of "goal-dependent" automaticity (see below). Note that what is omitted from the *IF* preconditions is as important as what is included; in the previous example, the availability of attentional resources is not a requirement for either the preconscious or the goal-dependent effect to occur.

Preconscious, Postconscious, Goal-dependent: Three Species of the Genus *Automatic*

Preconscious automaticity

Preconscious processes have been discussed at length by many researchers and theorists (e.g., Dixon, 1981; Fodor, 1983). As I am using the term, for preconscious processes to occur, only the relevant, triggering proximal stimulus event is needed. They do not require the individual's conscious awareness of the event, or intention that the process occur. My use of "preconscious" incorporates "preattentive" processes as described by Treisman et al. (1992). Whereas preattentive processes are largely innate or developed early in life, preconscious ones include as well those that develop through considerable experience with an environmental domain. Also, unlike preattentive processes, preconscious ones may require a modicum of spatial attention to the triggering stimulus event (see Dark et al., 1985; Kahneman & Treisman, 1984). However, both preconscious and preattentive processes operate autonomously, involuntarily, nearly effortlessly, uncontrollably, and prior to and even in the absence of conscious awareness of the stimulus event.

In terms of the ecology of automaticity, preconscious processes are clearly the most common form of automatic process in the natural environment, because all that must be in place for them to occur is the mere presence of the relevant proximal stimulus event. Frequency as well as consistency of processing that stimulus event in the past is a prerequisite of the development of a (learned) automatic process (e.g., Shiffrin & Schneider, 1977). Therefore, the "relevant stimulus event" is likely to be present often, and so the preconscious analysis of it is likely to occur often. Moreover, the probability of a preconscious automatic process is not decreased by the additional stipulation that *both* the triggering stimulus event and a specific processing goal, or recent stimulus-relevant thought, must be in place for the *THEN*-autonomous process to occur.

Whereas preattentive processes appear limited to the coding of simple physical features such as color, size, and shape orientation (see Treisman et al., 1992), the more general class of preconscious processes has been shown to be capable of performing interpretations and evaluations of complex social stimuli (see Bargh, 1989). Individual differences have been found to exist as to which trait dimensions a person is preconsciously sensitive to, in that behaviors of another person relevant to that dimension are detected and encoded in terms of that trait concept even when attention is fully devoted elsewhere (Bargh & Pratto, 1986; Bargh & Thein, 1985).

In the Bargh and Thein (1985) study, for example, subjects were presented with two dozen behaviors of a target person in rapid order (1.5 s each). The rapid presentation conditions were designed to simulate natural social environment conditions (where behaviors may occur in rapid succession) and also to prevent deliberate, attentional processing of the behaviors. Half of the subjects possessed a chronically accessible trait construct (for honesty/dishonesty) relevant to most of the behaviors, and the other half did not (chronicity is assessed in these studies by using a free response, output primacy measure developed by Higgins, King, & Mavin, 1982). Only those subjects with the chronically accessible (i.e., preconscious) trait construct relevant to the input were able to form impressions under the overload conditions that reliably differentiated between a mainly honest and a mainly dishonest target; "nonchronic" subjects were unable to distinguish the targets.

The Bargh and Thein (1985) study demonstrated the efficient aspect of the operation of chronically accessible constructs; a further study by Bargh and Pratto (1986) showed that such operation is also uncontrollable in the presence of relevant stimuli. Using the Stroop color-naming task, trait stimuli relevant and irrelevant to a subject's idiosyncratic chronically accessible social constructs were presented. Subjects required more time to name the color of words corresponding to their chronic constructs, even though the word meaning was irrelevant to their task and subjects were trying to ignore the word meaning. An earlier study (Bargh, 1982) had shown a similar uncontrollable processing effect for stimuli relevant to the subject's self-concept; these produced greater probe reaction time latencies when presented to the unattended ear in a dichotic listening task, relative to subjects for whom the stimuli were not self-relevant.

As noted above, stereotypes (race, sex, and age-related) have also been shown to become activated preconsciously upon the presence of the easily distinguished defining features of the group (e.g., skin color, sexual characteristics, grey hair). Many studies have found that stereotype activation occurs unintentionally (e.g., McArthur & Friedman, 1980; Mills & Tyrrell, 1983), and other experiments have documented the efficient and effortless manner in which stereotypes operate (Devine, 1989; Pratto & Bargh, 1991). As several writers have noted recently (Bargh, 1989; Devine, 1989; Fiske, 1989), stereotype activation must be distinguished from stereotype use and influence—the former appears to be uncontrollable given the relevant proximal stimulus features, but the latter is controllable and hence not preconscious (or even automatic in any sense).

Preconscious automaticity is important not only because it is probably the most commonly occurring form of automatic process in the natural environment. Preconscious selection and interpretation of relevant stimuli occurs regardless of the current processing goal or the availability of attentional resources. Therefore, such input will constitute a more constant influence over subsequent consciously made impressions and social judgments, relative to other forms of social information. In addition, people are not aware of these preconsciously made interpretations (and evaluations; see Bargh, Litt, Pratto, & Spielman, 1989) and so trust in their validity and accuracy in the same way they trust their senses—for it is the same phenomenology in both cases. It is precisely because the individual is not aware of any inferential activity, and preconscious processes are experienced as fluent and noneffortful, that interpretations and evaluations of the stimuli are attributed to the event perceived, as obvious features of it that anyone could see (Bargh, 1988; Jacoby & Kelley, 1990; Johnson & Raye, 1981; Jones & Nisbett, 1971).

Consequently, preconsciously supplied forms of input into judgmental processes are weighted more heavily because there is greater trust and confidence in their validity. Consistent with this reasoning, Spielman and Bargh (1991b) found that behaviors corresponding to a subject's idiosyncratic chronically accessible constructs had more influence on the subject's overall evaluation of the target than the target's other behaviors.

Postconscious automaticity

For postconscious effects to occur, recent conscious experience or thought in the same stimulus domain as the automatic process is required. Such effects can be considered as "the nonconscious consequences of conscious thought" (Bargh, 1989, p. 14). The prototypic example of postconscious automaticity is priming effects, which have been widely studied in social judgment research (see reviews by Higgins, 1989; Higgins & Bargh, 1987; Wyer & Srull, 1986). In these studies, a social construct such as *intelligent* or *aggressive* is activated by relevant stimuli in one task (such as unscrambling word sequences to form a grammatically correct sentence). It is found that these subjects, in what they believe to be an unrelated task on impression formation, are more likely than unprimed subjects to interpret the ambiguously trait-relevant behavior of a target person in line with the primed construct. The primed constructs, while they remain active in memory, thus exert what to all appearances is a preconscious interpretation effect on the ambiguous stimulus. In fact, priming or temporary accessibility has been found to mimic chronic accessibility effects (e.g., Bargh, Bond, Lombardi, & Tota, 1986; Bargh, Lombardi, & Higgins, 1988). Thus, for all intents and purposes, it would seem that postconscious and preconscious automaticity are equivalent effects, the only difference between them being the necessity of priming or preactivation of the relevant construct.

However, this is not an insignificant difference when one wants to generalize the experimental results to the natural environment. Many studies have administered mood or personality questionnaires just prior to the test of the automaticity of subjects' processing in that domain, and have proceeded to draw conclusions about the chronic, essentially preconscious nature of that thought—as though it required only the triggering stimulus without the need for the prior conscious thought about that domain. But such effects may instead be dependent on recent conscious thought about the content domain (i.e., preactivation or priming of the relevant knowledge structures), and would not occur otherwise.

We have put this argument to the test recently (Spielman & Bargh, 1991a) in replicating two studies of automaticity in depressives' negative self-referential thought. In each of these studies, one using the Stroop task (Gotlib & McCann, 1984), the other an attributional style questionnaire (Pygzczynski, Holt, & Greenberg, 1987), the Beck Depression Inventory (BDI), a widely used measure of depression was administered just prior to a test of chronic, automatic negative thought tendencies. We replicated the procedures of the two experiments exactly, except that for half the subjects we administered the BDI just before the assessment of chronic negative thought, and for the other half we administered the BDI afterward. In both experiments, we obtained the same findings as did the original researchers, but only when the BDI was administered prior to the critical trials, not when subjects engaged in the test of automaticity without prior conscious thought about the depression-relevant themes inherent in the BDI.

Clearly, the consequence of assessing attitudes, personality, values, beliefs, and other attributes immediately prior to assessment of the automaticity of thought within the same domain is that one cannot know whether obtained automatic effects are postconscious or preconscious in nature. And one must assume, until demonstrated otherwise, that the prior conscious thought is a precondition for the effect, which certainly restricts its frequency of occurrence in the nonlaboratory world, and therefore probably its importance.

Goal-dependent automaticity

Another difficulty in generalizing the results of an automaticity study to the natural environmental conditions comes from the instructions given to the subjects. If one directs them to form an impression of the personality of a target person, for example, and then finds that they do so efficiently even with a load on attentional resources (e.g., Bargh & Thein, 1985; Gilbert et al., 1988; Smith & Lerner, 1986), one cannot conclude that such efficient and relatively automatic (in our core sense of then running to completion without conscious guidance) impression formation would have occurred without the goal. Indeed, it has been found that impressions are not formed without the explicit intention of doing so (Bargh & Thein, 1985, p. 1143; Sherman, Zehner, Johnson, & Hirt, 1983; Wyer & Gordon, 1982; see reviews by Bargh, 1990; Wyer & Srull, 1986).

Just as Otto's foot hit the brake upon seeing the stop sign when the goal of driving was operative, and did not do so when the driving goal was not operative (i.e., when he came upon the same stop sign as a pedestrian), so too may other automatic effects be dependent on having a specific processing goal in place. Procedural knowledge structures that have become automatic with practice or frequent use are the best example (Anderson, 1983, 1992; Smith, 1984). What such goal-dependent automatic processes require is the guidance of the processing goal plus the presence of the relevant triggering stimulus.

Just as what were in actuality cases of postconscious automaticity were portrayed as preconscious until the assumption that prior conscious thought was not needed was tested (and invalidated), one cannot conclude from an experimental design that gives subjects the explicit goal to engage in a process that the effect would occur without the operation of the goal in the natural environment. Nissen and Bullemer (1987), for example, showed that implicit pattern learning, which has been argued to be an automatic, nonconscious effect, does not occur unless the subject is both consciously attending to the task that presents the pattern *and* is attempting to learn the pattern itself. Therefore, previous demonstrations of implicit learning of covariations between personality traits and physical features in which subjects were told to form an impression of the target person and also that the study concerned their "personality assessment abilities" (e.g., Lewicki, 1986) would appear to fall into the class of goal-dependent automaticities.

CONCLUSIONS

My themes in this article are not new. First, that the unitary, all-or-none dichotomy of automatic versus controlled processing has been misleading in practice has been cogently argued by Logan and Cowan (1984) and Logan (1989; see also the many authors in this issue who comment on the many senses of the term "automatic"). Second, that researchers should pay careful attention to aspects of their paradigms that might contribute to the production of an automatic effect, and attempt to remove these preconditions in order to gain an accurate picture of the necessary conditions for the effect is very similar to the prescription of Johnson and Hasher (1987) in their review of automaticity research. They warned (p. 655) that without such thorough task analyses, the theoretical conclusions drawn from the results may well be incorrect.

By deconstructing the monolithic nature of the concept of automaticity into its component features, we can better assess the ecological validity of the effect in question. Instead of studying just one or perhaps two of the defining features and then assuming the presence of the remainder by default, researchers should examine all aspects that are relevant to the real-world phenomena under study. For instance:

1. If an explicit intention or processing goal is required to produce the effect in the laboratory, how probable is it for a person to have such a goal outside the laboratory? Are there individual differences as to who would be likely to have such a goal in the first place? Are there situational characteristics that are likely to produce these intentions (see Bargh, 1990)?

2. If the effect requires recent prior conscious thought about the relevant domain, how likely is it people will spontaneously engage in such thought? For some topics, such as the self, such prior thought would be much more probable than for other topics.

3. Does the effect require the availability of attentional capacity, and if so, will sufficient attentional capacity be available in the natural settings to which one wants to generalize? For instance, research findings in the areas of causal attribution (Gilbert et al., 1988), person memory (Srull, 1981), and stereotyping (Pratto & Bargh, 1991) are different depending on whether subjects' attentional capacity is loaded or not. Given the complexity of the interactive social environment, high demands on attention (listening to what others are saying, monitoring their gestures and facial expressions, planning one's own responses, deciphering others' motives, deciding whether one likes another person or not) are likely to be the norm rather than the exception,

and so laboratory situations in which the subject has plenty of time to ponder single, clearly diagnostic pieces of information may have low ecological validity (Bargh & Thein, 1985).

4. Is the effect controllable, or will it occur despite the person's attempts to stop it (see Tait & Silver, 1989)? If individuals are not aware of the effect, will making them aware of it permit them to control it (see Bargh, in press; Higgins & Bargh, in press; Moretti & Shaw, 1989)?

Obviously, the fewer the conditions that must be in place to produce an effect, and the more likely those conditions are to occur in the natural environment, the more constant and general the influence of that effect will be. Preconsciously automatic processes will therefore be the most influential in everyday judgment and behavior, as they require only the presence of the proximal stimulus event. Those processes that require intention and attentional resources as well must necessarily be less general and influential, because sufficient attention may not be available and other intentions might be in place at the time the critical stimulus event occurs.

As noted elsewhere in this issue, the concept of automaticity has developed multiple meanings, and this has caused some misunderstandings and confusion among researchers and consumers of that research. There is really no need for such confusion, because the relatively orthogonal issues of intentionality, awareness, autonomy, and efficiency of a cognitive process are important in their own, separate right. The prescription seems clear: Models of an automatic phenomenon should conceptualize it as automatic *given a set of necessary preconditions,* and research on the phenomenon should attempt to determine the minimal conditions needed to produce it.

Notes

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1. Just as the Stroop effect has been shown to require attentional resources to occur, so too there is now an indication that stereotype activation does not occur without focal attention devoted to the target individual, such as when subjects are given a concurrent task during exposure to the target (Gilbert & Hixon, 1991).

2. Finer discriminations of varieties of automaticity may be made within these three basic types, but will not be discussed here (see Bargh, 1989).

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