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Automaticity in Social Psychology

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It is of utmost importance to us to know our capabilities and our limits, what we can and cannot do. We are constantly comparing ourselves with others to learn more about how our opinions and abilities match up to theirs (Festinger, 1954). Highly related to this need to know ourselves is the need to feel in control of our environment, and to believe that we can attain the goals and outcomes important to us (Pittman & Pittman, 1980; Seligman, 1975).

That there may be important forms of thought that are not under our control, that are autonomous and detached from our intention and will, is therefore disturbing and disquieting news. The furor that erupted in the popular press over the publication of B. F. Skinner's *Beyond Freedom and Dignity* in the early 1970s serves as a telling example. Here was a leading behavioral scientist telling us that free will is but a delusion, that in reality our behavior is under the control of our environments and our history.

In the years since Posner and Snyder (1975; see also Neely, 1977) and Shiffrin and Schneider (1977) provided the first theoretical models and empirical evidence for automated information processing of single words, letters, and digits, a considerable amount of research has shown that the reach of automatic influence extends far beyond the encoding of such simple stimuli. Much social information processing has been discovered to be more or less automatic: the understanding of behaviors in trait terms, causal attributions for another's behavior, judgments about the self and other people, the making of stereotypic assumptions about others based on their race, age, or gender, and so on. It was one thing for reading or driving or detecting digits and letters to be automatic and autonomous, able to operate without our conscious control, as the early automaticity research had shown. But it was another thing entirely when our understandings and judgments of ourselves and others were found to be not fully intentional or under our control.

THE SCOPE OF AUTOMATIC INFLUENCE IN EVERYDAY LIFE

Automaticity in Feeling and Thinking

Research on these issues continues today (see reviews in Bargh, 1989, 1994; Greenwald & Banaji, 1995; Smith, 1994); by now, there are very few research phenomena in social psychology that have not been shown to occur at least partly automatically. A person's affective reactions to another individual are often immediate and uncontrolled: Attitudes toward social and nonsocial objects alike become active without conscious reflection or purpose within a quarter of a second after encountering the object (Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). And the emotional content of facial expressions is picked up outside conscious awareness and intent to influence perceptions of the target individual (Murphy & Zajonc, 1993; Niedenthal, 1990; Niedenthal & Cantor, 1986).

Immediate and automatic reactions to another person are not limited to global evaluative or emotional reactions, however. Stereotypes of social groups who are in the power minority (e.g., women, the elderly, racial minorities; see Fiske, 1993) become active automatically, requiring only the perception of the diagnostic group physical features in an individual (Brewer, 1988; Devine, 1989; Pratto & Bargh, 1991; but see Gilbert & Hixon, 1991). Social behaviors are encoded directly in terms of the trait concepts to which

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by all four features of automaticity, or by all four features of controlled processing. Soon, however, it became clear that very few cognitive processes satisfied all of the criteria for automaticity (see Kahneman & Treisman, 1984; Logan & Cowan, 1984), especially the processing of stimuli complex enough to interest a social psychologist. There were many demonstrations of automatic processing of social information in the 1980s, for instance, and none of them satisfied all four criteria (see Bargh, 1989, 1994). Demonstrations of automatic dispositional attributions, or behavior-to-trait inferences, or social judgment, or stereotyping, all required explicit instructions to the subject to engage in that type of processing (which then was shown to be efficient), or did not involve an explicit processing goal yet the process did require attentional resources to occur.

Most processes of interest to social psychologists have some features of an automatic process (e.g., efficient) and other features of a conscious process (e.g., intentional). Consider the classic automaticity examples of driving or typing, for the experienced driver or typist. A person can eventually learn to drive or type so efficiently that very complex perceptual and motor skills can operate without conscious involvement, with minimal attention needed, and so on, but this automated process nonetheless would not have occurred without the individual's intention to drive or to type. A person does not see a piece of paper in a typewriter and without realizing his or her behavior, sit down and begin typing away, and only the most habitual car thief imaginable would see a car, get in and drive away without any intention to do so.

To employ a more social example, let us assume that people make spontaneous trait inferences (Winter & Uleman, 1984): They encode behavior in terms of trait concepts without intending to do so (e.g., when instructed to memorize the behavioral sentences). Yet when their attentional capacity is "loaded" with a secondary task, evidence of spontaneous trait inferences disappears (Uleman, Newman, & Winter, 1992; Winter, Uleman, & Cunniff, 1985). Thus we have a process that occurs without intention, but does require capacity (i.e., does not satisfy the efficiency criterion of automaticity). As another example, early research evidence that stereotyping was "automatic"—that is, occurred without intention—was taken by many to mean that it was also uncontrollable (because uncontrollability was another criterial feature of automaticity). If automaticity were really an all-or-nothing phenomenon, with all features present or not in unison, evidence of unintentionality (or efficiency, etc.), would actually mean the presence of the other features, such as uncontrollability. But as Devine (1989), Fiske (1989), and others have persuasively argued, stereotyping is not uncontrollable and inevitable; it can be controlled through an act of effort and will even though it can occur unintentionally.

As a final example, several studies had demonstrated the efficiency of a process—notably, the pickup of behaviors relevant to the individual's chronically accessible trait constructs and their subsequent influence on impressions (Bargh & Thein, 1985), and the procedure of judging behaviors as evidence of a given trait (Smith, Branscombe, & Bormann, 1988; Smith & Lerner, 1986). Because in all these studies the subject had been instructed to engage in that process (form an impression or judge the behavior), however, the researchers certainly never meant to claim that the process was unintended. Yet, were the monolithic model of automaticity as involving all four defining features actually true, the experimenters would never have needed to tell subjects what to do, as efficiency would have meant the effect was also unintentional. No evidence exists, however, that impression formation or trait judgment procedures occurs without the intention that it occur; in fact, Chartrand and Bargh (1996) have presented some subjects with the same series of behaviors as in the Bargh and Thein (1985) study but with no impression formation instructions, and there was no evidence of any impressions formed by these subjects. Other subjects, however, had the goal to form an impression primed subliminally in a prior study, and these subjects showed the same results as those with a conscious goal to form an impression in Bargh and Thein's (1985) study. It is clear, then, that while impression formation can be a very efficient process, it nonetheless requires an intention or goal to occur (even if that goal can be activated outside awareness). The efficiency and unintentionality features of automaticity do not covary in an all-or-none fashion.

Defining Qualities

Intentionality refers to whether an act of will, of which the individual is aware, is a necessary condition to put the process in motion; that is, to start it. A person may intend to drive to the store, and with that intended procedure of driving the car in operation, many components of driving, such as hitting the brake pedal on seeing a stop sign, may be reflexive and autonomous. Given the intention to drive, then IF [stop sign] THEN [foot hit brake]. However, without that intention to drive, merely seeing the stop sign does not cause the foot to kick out at an imaginary pedal.

An unintentional process, on the other hand, means that a conscious act of will is not required for the automatic process to occur. Only the triggering stimulus (e.g., the presence of gender or racial features) is needed to start the automatic process (e.g., stereotype activation).

Whereas intentionality of a process refers to the conditions needed to start it, *controllability* refers to a person's ability to stop a process once it is operating (Logan & Cowan, 1984). For example, stereotype activation by relevant personal features may be unintended, but the use of application of the stereotype in making judgments about the target person is controllable (Devine, 1989; Fiske, 1989). The individual can stop the automatic process of stereotyping after it has been put into motion by the environment. Just because a process is controllable does not mean that the individual will exercise control; assertion of conscious control over the default automatic process requires an act of will, what Fiske (1989) has called "making the hard choice."

In moving across the spectrum from mental processes that are routinely driven by the environmental stimuli, such as sensation and perception, to those that are on the response end, such as judgments and decisions and behavior

they correspond, in the case of unambiguous behaviors (Higgins & Bargh, 1987; Uleman, Newman, & Moskowitz, 1996; Winter & Uleman, 1984), and in terms of the more accessible relevant construct in case the behavior is ambiguous (e.g., Bargh, Bond, Lombardi, & Tota, 1986; Higgins, King, & Mavin, 1982; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979). The consequent attribution of this trait to the actor's disposition (rather than to situational forces) also appears to be an automatic, reflexive tendency (e.g., Gilbert, 1989; Gilbert, Pelham, & Krull, 1988).

One consequence of this research was that the extent to which an individual was capable of treating another person fairly and equitably and without bias was called into question: legal issues of culpability and responsibility were raised in matters of discrimination and prejudicial behavior (Fiske, 1989). Moreover, the intractibility of emotional disorders was underscored when automatically negative self-appraisals were found to be a contributing factor (Bargh & Tota, 1988; Beck, 1976; Beck, Rush, Shaw, & Emery, 1979).

Automaticity in Doing

Although subsequent social behavior is certainly based on these automatically activated attitudes, stereotypes, and attributions, constituting an indirect form of environmental control over behavior (see relevant arguments by Bargh, 1989; Fazio, 1986, among others), there is growing evidence that goals and intentions and even social behavior can become automated themselves, to be directly activated and enacted on the relevant situational triggering events (Bargh, 1990; Bargh & Barndollar, 1996; Bargh & Gollwitzer, 1994; Chaiken, Giner-Sorolla, & S. Chen, 1996). Several theorists have posited the existence of automatic social interaction: Langer (1978), based on the nonconscious influences of situational scripts on expectancies within common situations; Berkowitz (1984), in terms of spreading activation from perceptual to motoric representations of the given type of behavior; Bargh (1990), in terms of preconscious activation of goals chronically associated with that situation.

While research on automatic scriptal influences on behavior (e.g., Langer, Blank, & Chanowitz, 1978) has not effectively ruled out the involvement of conscious choice and awareness of the resultant behavior (see Abelson, 1980; Bargh, 1984; Kitayama & Burnstein, 1988), evidence is accruing in favor of Berkowitz's (1984) proposed automatic perception-behavior link. This was the mechanism that, according to Berkowitz, accounted for the influence of the mass media (and aggressive cues, guns in particular) on aggressive behavior. Carver, Ganellen, Froming, and Chambers (1983) provided an experimental test of this hypothesis. Subjects were either surreptitiously primed with words related to the trait of hostility or with neutral words, and then put into the role of a "teacher" subject who was to shock another "learner" subject (actually a confederate who was not really shocked) when the latter made incorrect responses. Those primed with hostile-related words, unaware of any bias, gave longer shocks to the confederate than did the other subjects. Because subjects had been told to shock the confederate, however, the necessity of conscious intent for this effect cannot be ruled out. But research by Bargh, Chen, and Burrows (1996) has demonstrated similar behavioral effects of nonconsciously primed traits (e.g., rudeness) and stereotypes (for the elderly and African Americans) on behavior, providing clearer support for automatic social behavior via activated perceptual representations.

As for the third hypothesized route from environment to behavior, that environmental stimuli can directly activate goals and motivations that then operate outside awareness to guide thought and behavior, supporting evidence is also mounting. Cognitive processing goals and motivations, such as to form an impression (Chartrand & Bargh, 1996), engage in ego-defensive processing of persuasive messages (Chaiken et al., 1996), and preserve consistency between the self-concept and the individual's recent behavior (Cialdini, Trost, & Newsom, 1995), all have been shown to be capable of nonconscious activation and operation, producing the same outcomes as if they had been intentionally selected. And motivated behavior has also been produced through nonconscious priming in several experiments; for example, Bargh, Gollwitzer, and Barndollar (1995) primed the concept of achievement, and subjects so primed scored significantly higher on word search puzzles, and persisted longer on the task compared with nonprimed subjects. These various studies, taken together, are fairly convincing evidence that automatic effects of the environment are not limited to attitudes and social judgments.

My goal in this chapter is to provide some background and context for understanding automaticity research: what it is, why it is important, where it comes from (its historical roots in research on selective attention and skill acquisition), and where it might be going.

WHAT IS AN AUTOMATIC PROCESS?

The False Dichotomy

Historically, automaticity has been defined in terms of several different features (Johnson & Hasher, 1987; Posner & Snyder, 1975; Shiffrin & Schneider, 1977). An automatic process was said to be *unintentional* (the individual does not start the process by an act of will), to occur *outside awareness*, to be *uncontrollable* (the individual cannot stop it once it has started; Logan & Cowan, 1984) and to be *efficient* or consume minimal attentional resources. (The efficiency criterion has also been expressed in terms of the process not interfering with other conscious processes; in other words, it can occur in *parallel* with other processing.) Conscious or controlled processes were characterized by the mirror images of these features: They were said to be intentional, controllable, the person was aware of their occurrence, and they were consumptive of attentional resources and so occurred serially, one at a time.

Originally, it was believed that these two forms of processing—automatic and conscious (or controlled)—were mutually exclusive and also exhausted the universe of forms of processing: A process was characterized either

back to the environment, the degree to which the individual can control processes increases greatly. We cannot actually see an orange as being blue no matter how hard we will it so, but we can control or stop or "gate" nearly all internal impulses set in motion by environmental events from manifesting themselves in responses to the environment (Logan & Cowan, 1984), as long as we are aware of these impulses (Bargh, 1989).

Lack of awareness of a process as a feature of automaticity is the quality that sets it in most dramatic contrast to conscious processing. In general, the more frequently and consistently a given mental process is engaged in, the less conscious attention it requires (Atkinson & Shiffrin, 1968; Newell & Rosenbloom, 1981). Eventually it requires so little that it can operate outside awareness entirely. Thus such efficient and often-used mental structures such as the self-concept (Bargh, 1982), social trait constructs (Bargh & Pietromonaco, 1982), and racial stereotypes (Devine, 1989, Experiment 2) can become activated outside awareness using subliminal stimulus presentation techniques.

Being unaware of the operation of a process—say, stereotyping—is important for its controllability as well. An individual cannot control a process without awareness that it is occurring. To me, this is an important caveat to any contention that people can "make the hard choice" and counteract automatic processes from influencing social judgment and behavior (Bargh, 1989). If people are not aware of stereotyping, what chance do they have of stopping themselves from doing so, and preventing the stereotypic influence?

One answer is that there are different aspects of mental life of which the individual can or may not be aware (Bargh, 1992). First take the case of pure subliminality: lack of awareness of the triggering stimulus event itself, as in the New Look perception research (see reviews by Allport, 1955; Erdelyi, 1974) or subliminal mere exposure effects (see review by Bornstein, 1989). Next, there might be awareness of the stimulus but not the effect it has, as in the classic misattribution studies (e.g., Schachter & Singer, 1962; Zanna & Cooper, 1974; Zillman & Bryant, 1974). In those studies, subjects were certainly aware of the stimulus event but not of its effect on them, and so misattributed the cause of the effect to something more obvious or consistent with their own private theory of what must have caused the effect (Nisbett & Wilson, 1977). Thus, in the Zillman and Bryant (1974) paradigm, subjects misattributed their increased arousal due to sexually explicit stimuli to anger at the insult they received from a confederate, and so shocked the confederate more often, intensely, and so on.

For social psychological phenomena, it is this lack of awareness of the effect of a stimulus—not awareness of the stimulus itself (subliminality)—that is the critical variable in determining how a person will react to it (Bargh, 1992). Category priming effects on impression formation, for example, are identical whether subjects are aware or not of the priming stimuli. What matters is whether the subjects are aware of the potential effect or influence of the priming stimuli on their judgments. If they are not, assimilation effects are obtained; if they are aware, as when very extreme priming stimuli are employed (Herr, Sherman, & Fazio, 1983), contrast or other effects are obtained (see Strack & Hannover, 1996; Wegener & Petty, 1995). When the person is aware of an influence they can control or adjust for it. Thus awareness of the possible effect of a stimulus is critical for the controllability of the effect.

Applied to the case of stereotyping, then, even if individuals are not aware of being biased, they can still control a stereotypic influence if they are aware of the possibility of being so influenced. In that case, they do not have to rely on the default process, their intuitive "feeling" about the target individual, and can instead supplement and correct the output of their category with effortfully obtained and considered individuating information and skepticism regarding their easily arrived at stereotypic impressions of the target (see Fiske & Neuberg, 1990).

Efficiency is primarily important as a process quality because it means the process is not constrained by limits on or the current focus of attention. How impressions and attributions are made under conditions of information overload is largely a function of the relative efficiency of different ways of processing the available information. For example, in the middle of a business meeting involving several people, one of the participants may be very interested in what the others are like, how reasonable or aggressive or intelligent or duplicitous, and so on. And she is forming impressions about several targets simultaneously (see Rothbart, Fulero, & Evans, 1979). However, she is not just sitting there during this meeting as a passive social information processor. In fact, these impressions are rather low on the processing priority totem pole. She is focusing more on pursuing her goals for the meeting, planning her responses, course of action, comprehending what is being said by others as it relates to the purpose of the meeting, considering the relative power and status of the participants as these factors constrain her behavior, and so on. In short, there are a lot of things to attend to at once. Thus, the subset of person information that does get through is that which is very efficiently processed.

Experiments have investigated what happens under such overload conditions (see Bargh, 1994, for a review). They have used a variety of techniques, including (a) the rapid presentation of information so that the subject is prevented from considering any piece of information at his or her leisure or in relation to other presented information (i.e., the process of integration; Bargh & Thein, 1985), giving subjects a great deal of information to consider and assimilate, more than can be remembered later (Rothbart et al., 1979), putting time pressure on subjects' responses (Strack, Erber, & Wicklund, 1982), and giving subjects a simultaneous task (such as keeping a long series of numbers in working memory) that is difficult enough to require considerable capacity (Bargh & Tota, 1988; Gilbert et al., 1988; Wegner & Erber, 1992; Winter et al., 1985).

By preventing subjects from dealing with social information in deliberate, conscious manner, investigators are able to see what kinds of information get through regardless of the subjects' current purposes and conscious focus, and also how judgments and decisions are made under these natural conditions of stress. Many forms of information—those not corresponding to very efficient, chronically

accessible knowledge structures—may not be picked up at all under the following conditions:

1. If there is information overload or time pressure that makes time-consumptive controlled processing impossible. There may be internal distractions that can cause overload as well as external ones (e.g., headaches, illness, preoccupation with important upcoming events, tiredness).
2. If the subject does not have the motivation, or need, or interest to engage in the effortful processing even though there may be ample time and attention and few distractions (see Bargh & Thein, 1985; Devine, 1989; Fiske, 1989).

Such studies have revealed that certain forms of information are chronically attended to and encoded, and then influence judgments constantly—self-relevant (Bargh, 1982), chronically accessible trait constructs (Bargh & Thein, 1985); also that certain kinds of causal judgment are made by default such as dispositional attributions (Gilbert, 1989) and the tendency to believe verbal assertions (Gilbert, 1991). These default processes can be adjusted or corrected in a second effortful processing stage—but again, only if the person has the time, attentional capacity, and interest in doing so. By logical necessity, therefore, the correction stage has to be engaged in less frequently than the default stage, accounting for the preponderence of dispositional attributions (see Ross, 1977) and the tendency for an individual to use the same limited set of dimensions in impression formation for everyone he or she encounters (Higgins et al., 1982; Mischel, 1979; Mischel & Shoda, 1995).

Because efficient processes operate any time they are relevant regardless of the availability of attention, current concerns, or focus of attention, an understanding of these default processes is extremely important in generalizing laboratory results to the noisy and stressful real world.

Some Recommendations

Processes, such as stereotyping, that have several features of an automatic process (the person may not be aware of the stereotype activation and does not intend to stereotype, and the stereotype operates very efficiently with minimal attention) are nonetheless controllable (Devine, 1989; Fiske, 1989). If the four defining features of automaticity *did* occur in an all-or-none fashion, then this would not be the case. However, the case of stereotyping and prejudice underscores the very important point that social psychological cognition usually involves higher mental processes, which are seldom single cognitive processes but are composed of several component processes. Devine's (1989) analysis showed that stereotyping is composed of at least two separable processes: stereotype activation (relatively uncontrollable) and stereotype use in judgment of an individual (relatively controllable—*if* the individual is aware of the potential stereotype influence).

The preceding discussion leads to some recommendations and caveats that should be kept in mind by any researcher interested in the automaticity of a given social psychological phenomenon:

1. Do not treat "automaticity" as a monolithic concept, but instead focus on the particular feature that is most relevant to the phenomenon under study.

For example, if you are concerned with how a laboratory effect might or might not generalize to a busy real-life social interaction setting, focus on the efficiency of the process, not its possible unintentionality. If on the other hand, you are concerned with the controllability of a phenomenon (e.g., stereotype use), study the conditions (e.g., motivational) that might or might not enable such control. Relatedly, on evidence that the phenomenon possesses one quality associated with automaticity (e.g., unintentional occurrence), do not assume without further testing that the phenomenon possesses other such qualities (e.g., uncontrollability, efficiency). And when referring to the automaticity of the phenomenon, be precise as to what sense of the term you mean (e.g., efficiency), to avoid misunderstanding and confusion among your readers (e.g., they might assume you mean unintentionality or uncontrollability when you do not).

2. Analyze the phenomenon into its component processes, and consider which of these might be automatic and which controlled.

Shiffrin and Schneider (1977) concluded their seminal papers on automaticity with the proviso that most cognitive processes that are sufficiently interesting to study are likely to be composed of both automatic and controlled processes. Devine's (1989) analysis of stereotyping into its component processes provides a demonstration within social psychology of the benefits of a less molar, more fine-tooth consideration of the cognitive processes involved in producing the given phenomenon (see also Vallacher & Kaufman, 1996).

For example, is driving automatic (for the experienced driver)? When considered at the molar level, it is certainly an intentional act and is therefore not automatic. But this only serves to demonstrate the lack of usefulness of the concept of automaticity when applied to such a complex process as a whole. Certainly subprocesses and components of the act of driving are indeed automatic. They require very little attentional resources (resulting often in lack of memory for long stretches of the drive); decisions and motor movements are made without conscious intentional involvement; and so on.

AUTONOMY: THE ESSENCE OF THE CONCEPT OF AUTOMATICITY

What the driving example illustrates is that when boiled down to its essence, what is meant by the term "automatic" is that the process is *autonomous*, capable of operating by itself without any need for conscious guidance, *once put in motion*.

The conditions that instigate the process, that put it in motion in the first place, are critical, however, for its intentionality and controllability. In some recent discussions of

automaticity research (Bargh, 1989, 1992, 1994). I classified different varieties of automaticity according to the conditions needed for them to occur. *Preconscious* automaticity requires only the proximal stimulus event, that is, detection of the relevant stimulus by the sensory apparatus. For example, the activation of a racial or gender stereotype on the mere presence of a member of that group, or activation of a specific attitude toward a person or object on just the presence of that person or object. No intention or specific processing goal is needed for the effect and the person is not aware of the process occurring.

Postconscious automaticity is similar to the preconscious form in every respect except that the mental structures need to be *primed* or preactivated by recent (typically conscious) use. As will be discussed in more detail, mental structures differ in their readiness to become activated by relevant stimulation, or their *accessibility* (see also Higgins, Chapter 5, this volume). Some are so chronically accessible that they are activated preconsciously by environmental features or patterns that match them; others are not so chronically accessible and are only automatically activated if they are residually active from recent use (i.e., postconscious automaticity). However, pre- and postconscious automaticity are functionally identical and the processing effects are the same; the only difference is in how the necessary level of accessibility is achieved (i.e., via chronic or temporary means).

The third major form of automaticity is *goal-dependent*, or autonomous mental processes that require an act of will to be put into operation (e.g., driving, self- and social judgments; see Smith, 1989). There have been several demonstrations of efficient social cognition processes that occur even when there is a load on attentional resources, such as self- and other-judgments (Bargh & Tota, 1988) and dispositional attributions (Gilbert et al., 1988). In these studies, however, the subjects were given the explicit goal to make the judgments, and so these efficient processes did require the intention to engage in them.

The Bargh and Tota (1988) study showed, in fact, that which set of mental structures became automatically activated was different depending on the target of the judgment. For depressives, negative trait constructs were automatically activated for self-judgments and positive trait constructs for other-judgments; whereas for nondepressives, the same set of positive trait constructs became automatically activated for both self- and other-judgments. What became automatically activated depended on the moment-to-moment processing goal. Asking about the self immediately and uncontrollably activated one set of trait concepts; asking about other people immediately caused a *different* set of concepts to become active.

What Sets the Automatic Process in Motion?

Considering the conditions needed to set an autonomous mental process in motion, we can see that there are essentially two forms or varieties of automaticity, one that is characterized by a lack of intention and awareness that the process occurs, and the other characterized by intentionality and awareness. We can collapse postconscious automaticity into the preconscious category in this regard because, as previously noted, their processing effects are functionally the same (see Bargh et al., 1986). Thus, one basic form of automaticity, which will be referred to hereafter as *preconscious* (see Bargh, 1997), occurs without intention or awareness of the process immediately on the perception of the triggering stimulus event. The other, *goal-dependent* automaticity, is an autonomous process requiring the intention that it occur (and thus awareness that it is occurring) but no conscious guidance once put into operation.

HISTORICAL ROOTS OF AUTOMATICITY RESEARCH

These two basic varieties of automatic processing evolved from distinct and separate lines of research. The phenomenon of preconscious automaticity has its roots in selective attention research dating back to Broadbent's seminal work. Goal-dependent automaticity comes from a different tradition, that of skill acquisition research.

Selective Attention Research

The roots of automaticity research in cognitive psychology are in the early work of Broadbent and Treisman on selective attention. A review of the history of this line of research is instructive because, early on, it pointed up several of the important issues and distinctions that occupy us today.

Broadbent's (1958) work on selective attention was one of the founding papers of the cognitive approach to psychology. Broadbent postulated an internal, intentional selection mechanism that "tuned" attention to focus on certain information in the environment and disregard others. Thus, in a dichotic listening experiment, the individual could tune attention to focus on what was being presented to one ear and ignore the other ear; resulting later in memory for the attended ear contents and no memory for what had been presented to the other ear. Audition was the perfect sense with which to make such a demonstration because people cannot close their ears or move them (as with the eyes) so that the information not selected is not even permitted to enter the sensory system. In the case of dichotic listening, there was nothing preventing the sensation of the message to the unattended ear, so that some *internal cognitive mechanism* (i.e., attention) must have been responsible for the differential processing.

This point may seem obvious and mundane today, but it was a major break with mainstream psychology at the time, which regarded internal "black box" mechanisms such as this as superfluous. And it allowed the study of "consciousness" to reappear, albeit by sneaking it in the back door.

Broadbent's was an "early selection" theory of attention, in that what information was to be selected was determined very early in the "stages" of information processing, prior to any complex analysis of the input for meaning or importance or relevance. Treisman's (1960) research quickly dispelled the notion of a purely early-selection model (based

mainly on the spatial location of the input". In her dichotic listening studies, subjects repeated out loud ("shadowed") a story being played to one ear and ignored the content of the other ear. However, at some point the story continued, seamlessly, in the unattended ear, and subjects sometimes (6% of the time) continued shadowing it before realizing their mistake and going back to the to-be-attended ear. If selection was as early as Broadbent's original proposal had maintained, no such distraction would have occurred. The contents of the unattended channel had to have been analyzed for meaning to some extent, and thus captured by their relevance to the current goal of the subject.

Although the frequency of attentional switching in Treisman's (1960) study was low, the fact that it happened at all had tremendous implications. Once it is acknowledged that some processing occurs outside conscious attention, the existence of nonconscious information processing has been established. And now questions abound, such as how such processing can occur, what is the extent of the nonconscious analysis of meaning, and so on—questions that we are still seeking the answers to today. Treisman's study was extremely important for the eventual development of the concept of automaticity, and can be considered the first experimental demonstration of automatic processing (see also Kahneman & Treisman, 1984).

As Treisman had shown that some selection occurred, theorists began to take positions as to how much. Deutsch and Deutsch (1963) took the extreme *late-selection* position, arguing that all proximal (perceived) stimuli were analyzed for meaning prior to attentional selection. This notion had the advantage of selection being based on the most complete knowledge possible as to the relative importance and relevance of available stimuli. Norman (1968) proposed a more moderate approach, in which the selection process was based on a *matching* between the current contents of awareness and new, incoming stimuli. Such a model captured the essential finding of Treisman (1960) very nicely and also seemed a more parsimonious and efficient use of mental processing capacity than suggested by the Deutsch and Deutsch full-analysis model (see Marcel, 1983, for a more recent version of a late-selection, complete analysis model).

Norman (1968) had provided a principle that could not only explain the processing of information outside the focus of conscious attention, but could also end the debate between the early- and late-selection theories. Norman's interactive model of selective attention was an *amount of activation* model, in which only the most highly active representations achieved the focus of conscious attention, and in which the amount of activation of any representation was determined both by top-down (expectations, goals, current stream of consciousness) and bottom-up (information in the environment) factors.

The essential principle that can be distilled from this early work on selective attention is the following: *information is likely to be processed outside conscious attention to the extent it corresponds to already active [accessible] mental representations*. The accessibility or amount of preactivation of the representation can come from several sources—current goals, recent activation, and chronic activation (Higgins & King, 1981)—but whatever the source, the effect on the probability of automatic processing is the same. Accessibility is the common coin in all cases: whether it is temporary or chronic, intended [due to a purposive goal] or unintended [due to recent use in an unrelated context], the sensitivity of the representation to the presence of environmental information regardless of the current focus of conscious attention is a function of its level of activation (Bargh et al., 1986; Bargh, Lombardi, & Higgins, 1988; Higgins, Chapter 5, this volume).

We know, for instance, that self-relevant information is capable of being processed when the focus of conscious attention is elsewhere. Cherry (1953) noticed that the subject's own name was the only kind of stimulus he could find that could break through the attentional barrier in a dichotic listening task and dubbed this the "cocktail party effect." Bargh (1982), in another dichotic listening study, showed that this self-relevance effect in automatic processing held not only for the person's name but for those concepts included in the subject's self-concept. Importantly, the self-relevant trait stimuli did not break through the attentional barrier (i.e., subjects did not consciously notice them) but gave evidence of being processed nonconsciously (i.e., measures of capacity usage increased when they were presented). Bargh and Tota (1988) found that information relevant to the self-concept could be processed without conscious attention, in that a concurrent task that put a heavy drain on available attention did not interfere with the ability to make self-relevant judgments.

And that the determining factor was accessibility and not something specific to the self has been shown in a Stroop study (Bargh & Pratto, 1986) in which stimuli related to a subject's chronically accessible social constructs (those not necessarily self-descriptive but used habitually in the perception of others) showed greater interference with the attended color-naming task than did other stimuli. And Bargh and Thein (1985) showed that, similarly to the Bargh and Tota (1988) study, behavioral information (i.e., honest or dishonest behaviors) relevant to a subject's chronically accessible social construct for honesty was processed regardless of a heavy load on attentional capacity by a concurrent task.

That this automatic (nonattentional) sensitivity to information related to accessible representations does translate into selective attention effects has been shown by Higgins et al. (1982), and Bargh and Pratto (1986). Higgins et al. (1982) found that behavioral information corresponding to a subject's chronically accessible constructs was more likely than other information to be recalled at a later point. To demonstrate that this effect was caused by selective attention to construct-relevant information, and not by an advantage of those constructs in retrieval, Bargh and Pratto (1986) used the Stroop color-word paradigm to show an uncontrollable distraction effect for trait stimuli corresponding to the subject's idiosyncratic chronically accessible constructs. Sherman, Mackie, and Driscoll (1990) showed similarly that behaviors related to primed or temporarily accessible constructs were given more weight in subsequent impression judgments of the target person: this

finding is consistent with those behaviors receiving greater initial attention (see Fiske, 1980).

Skill Acquisition

It has long been recognized that thought and behavior patterns that were repeated frequently come to require less and less conscious attention; they become more "efficient" and eventually require no conscious attention at all. William James (1890, Ch. 4) described "secondarily automatic" thought and behavior patterns that developed out of extensive experience and functioned like instincts. Freud (1901/1965) mentioned this phenomenon in *The Psychopathology of Everyday Life*: "There is in fact a whole series of functions which we are accustomed to assume will be performed most exactly when done automatically—that is, with scarcely any conscious attention" (p. 173). And more recently, Miller, Galanter, and Pribram (1960) observed that if it were *not* true that repeatedly performed thought and motor activities required less attention the more one engaged in them, none of us would be able to get out of bed in the morning.

A second stream of automaticity research has focused on how well practiced processes subside into the subconscious (Atkinson & Shiffrin, 1968; Vera & Simon, 1993). Shiffrin and Schneider (1977; Schneider & Shiffrin, 1977) performed a series of studies that quantified both the development of an automatic perceptual skill (detection of single letter and digit targets in rapidly presented arrays of letters and digits) and the conditions that moderated its development. To attain complete automaticity in this task meant that reaction time to detect a target was entirely unaffected by the number of items in the array. In other words, the search could only have been done in parallel, because any degree of seriality in the search would mean that response times would be a positive function of the number of distractors in the array. Subjects engaged in the search task for hours each day throughout a semester, and it took thousands of trials to achieve this criterion of complete automaticity (i.e., requiring no attentional resources).

Moreover, automaticity in this (intentional) search task was only achieved when a given stimulus was always a target or always a distractor (i.e., consistent mapping of stimuli to target or distractor condition). When a given stimulus was sometimes a target and sometimes a distractor (i.e., varied mapping), automaticity did not develop. Thus both *frequency* and *consistency* of processing were shown to be necessary for the development of automaticity (see also Schneider & Fisk, 1982; Shiffrin & Dumais, 1981).

Although a massive amount of practice was needed to achieve total independence from attentional processing, Shiffrin and Schneider's (1977) results showed a relatively quick gain in efficiency approaching the eventual asymptote, with further practice showing diminishing returns (see also Logan, 1979). Newell and Rosenbloom (1981) quantified the relation between practice of a skill and the attentional resources it requires in terms of an inverse power law. If the *y*-axis shows the amount of attentional resources needed for the process, and the *x*-axis depicts increasing amounts of practice, the inverse power function relating attentional needs to practice (assuming consistency of processing) features a rapid decrease at the outset but with the decrease becoming more and more gradual with increases in practice.

Anderson (1983) proposed the ACT* model of skill acquisition in terms of production systems: autonomous IF-THEN sequences that occurred whenever the IF conditions were met. These productions or *procedures* became more efficient over time, following the inverse power law. Smith (1984, 1989; see also Smith & Lerner, 1986; Smith & Branscombe, 1988; Smith, Branscombe, & Bormann, 1988) applied Anderson's model to social judgment. His research has shown how making social judgments can be conceptualized as a case of procedural learning, in which with practice, the production systems that perform the inference become strengthened and therefore more efficient. Smith has analyzed the components of this increased efficiency with experience in making certain types of judgments and found evidence for both a general behavior-to-trait component and stimulus-specific components (increases in efficiency in judging the particular behaviors). Smith and Lerner (1986) showed that the increase in efficiency of social judgments (i.e., trait judgments about single behaviors) with practice followed the same power curve that Newell and Rosenbloom (1981) and Anderson (1983) found for skill acquisition in general, with a relatively quick increase in efficiency and diminishing returns after that. Moreover, even one trial of practice produced a reliable and long-lasting gain in efficiency.

One of the more important findings of this research program is that the practice effect transfers from one target trait to another, so that when subjects begin to judge whether the behaviors exemplify a different target trait they are faster compared with subjects performing such judgments for the first time. Smith (1989) points out that trait category accessibility alone cannot account for this positive transfer (because a new trait category benefits from the previous practice). Thus, Smith argues, findings such as Bargh and Thein's (1985) in which chronically accessible trait constructs for honesty were shown to enable processing of a target person's honest and dishonest behaviors even under severe attentional overload most likely indicate efficient *procedures* for judging honesty from behavioral evidence rather than solely the accessibility of the construct of honesty.

Compilation and Autonomy

Smith's research, as well as that of Shiffrin and Schneider (1977), Neely (1977) and others, has shown how complex cognitive procedures can become "compiled" from what were originally separate component procedures. Presumably, inferring a trait from an observable behavior involves several component processes: inferring the intentionality of the behavior, sorting through the situational forces operating that may have influenced it, inferring the goal of the actor (what he or she was trying to accomplish), and matching all these features to those stored in the trait category in memory, and finally making a decision as to whether the degree of match is sufficient (see Bargh & Tota, 1988; McCloskey & Glucksberg, 1979). Before this judgmental skill

becomes automated, each of these steps must be performed effortfully and in serial order. When the procedure becomes compiled, all component processes operate in parallel and with only minimal attention needed. More importantly, they operate autonomously, so that conscious intentions are not needed to coordinate and prioritize the different component activities.

Vera and Simon (1993) provided a cogent analysis of skill automation, in terms of functional symbolic levels. In their view, once a skill is mastered, the relevant environmental information is represented in consciousness in such a way as to permit its processing at a "high" functional level, with no awareness of the processing done at lower (subroutine) functional levels. They term this phenomenon *functional transparency*: The individual can operate at a high functional level without needing to know much about the details.

Some analogies may help make this point clearer: Imagine a chief executive of a corporation who makes decisions regarding the company and delegates carrying out those decisions to lower-level executives, who delegate further, with the chief executive being unaware of the details of how the decisions are being carried out. Or take the example of speech production in your native tongue versus a new language you are trying to learn. In a conversation in your native language, you merely have to will the idea to be expressed, and the transformation of this idea into specific words and sentences—not to mention the motor movements of the mouth, tongue, and stomach, to produce the appropriate sounds—follow immediately and without conscious involvement or guidance once the act of will occurs (Dell, 1986). The chief executive *can* become aware and involved in the carrying out of her decisions, and you *can* deliberate on the precise words to be spoken and focus awareness on the bodily production of the appropriate sounds, but neither is *necessary* to enact the decision or speak the piece.

DEVELOPMENT OF AUTOMATICITY

In its simplest form, then, an automatic process can be conceptualized as an IF-THEN relation (see Anderson, 1983, 1992; Bargh, 1992; Smith, 1984). IF certain conditions hold in the cognitive environment, THEN the process in question will run to completion.

How do these automatic IF-THEN sequences come to exist? How long do they take to develop? How long do they continue to operate when circumstances change, when the IF-THEN sequence no longer holds in the environment?

According to Shiffrin and Schneider's (1977; Schneider & Fisk, 1982) research on the development of automaticity, both the *frequency* and the *consistency* with which the mental process follows the given stimulus event are critical. The requirement of frequent and also consistent pairing of the environmental event with the relevant thought process can, in fact, be found in James's (1890) treatment of habit development and dissolution, as well as in Hebb's (1949) principles of schema development.

According to classical principles of the association of ideas (Anderson & Bower, 1972; Hebb, 1949), associative connections in memory form between mental representations that are active concurrently. These associations are only weak and transient at first but with sufficient frequency of contiguous activation, the bond becomes strong enough that the associative features become active in an all-or-none fashion when any one feature is present (Hayes-Roth, 1977).

Hebb's classic example was of how one forms the representation of a triangle. At any moment, the focus of attention is on one corner or angle or side, and this focus of attention corresponds to the feature representation currently activated in the mind. As the individual shifts attention from feature to feature, mental associations are forming between the various feature representations that are concurrently activated. Eventually the repeated contiguous activation of all the triangle's features coalesce into a single, higher-order representation.

Patterns of features that nearly always co-occur, such as the spatial arrangement of eyes, nose, and mouth on the human face, quickly form automatic interconnections (Neisser, 1967).

Automaticity thus develops as a reflection of the regularities of the world. Eventually we come to recognize consistently occurring patterns with little mental effort. We do not see windows and doors and bricks but buildings, not glass and metal and rubber but automobiles; in short, we see the objects and events we interact with without having to consciously assemble them. This is known as preconscious processing (Bargh, 1994; Neisser, 1967).

To reflect regularities in the environment, frequency of activation is a necessary but not a sufficient determinant of an automatic association. For activation to be automatic, and to be removed from the purview of conscious choice and decision, the probability of the two features or events co-occurring must be very high. This is to avoid the cost of automatically coming to an incorrect conclusion. Thus consistency as well as frequency of coactivation is necessary. Shiffrin and Schneider (1977; Schneider & Shiffrin, 1977), in their seminal studies on automatic process development, varied the consistency with which a given stimulus (e.g., the letter "N") served as a target in a search task versus as a distractor item. Automatic detection of the target, in terms of being immediate and not affected by how many distractors there were (which would lengthen a conscious, serial search operation; see Sternberg, 1966), developed for the consistently mapped targets but not for those that were sometimes targets and sometimes distractors. This failure of automatic development for the variably mapped targets was in spite of the high frequency with which the symbol appeared as a target—thousands of trials. Thus despite considerable frequency of experience searching for that target, because the response to it was not regular or predictable (sometimes yes and sometimes no), the response was not delegated to automatic processing but left within the jurisdiction of conscious, aware choice.

Automaticity is a continuum and not an absolute, all-or-nothing state. While the absolute level of noninterference with conscious processing and ability to not be affected by concurrent demands on attention may take considerable experience, gains close to asymptote efficiency levels can accrue with as little as 16 or so trials of experience in

Smith and Lerner's (1986) social judgment task (see also Logan, 1979). In fact, there is a significant gain or savings with just a single trial (Smith, Stewart, & Buttram, 1992). In general, the function of automaticity development is best described by an inverse power curve (Anderson, 1983; Newell & Rosenbloom, 1981; Smith & Lerner, 1986) with quick gains in efficiency and then reduction to the point of needing no conscious involvement and capacity only with extensive further experience. It is one thing to grant efficiency with some experience, it is quite another to remove the process from the realm of conscious awareness (and thus, control) entirely.

The development of automatic social information processes, and their flexibility in the face of changing social environments (e.g., moving from the country to the city), are both important but underresearched topics in social psychology. People develop a certain chronic framework for interpreting and encoding the behavior of others (Higgins et al., 1982), that then operates at a preconsciously automatic level (Bargh, 1984), so that they are not aware of the interpretive bias any more. But what happens when the circumstances change, when a child, for instance, makes the transition from grammar to middle school (see Ruble, 1994) where the social norms and his or her relative status change dramatically? What happens when a person moves on to a different sphere of life, a move to a new country or region of the country, to a city for the first time, to a new job (e.g., from graduate school life to an academic position) with an entirely different set of norms and new acquaintances? Do the same chronic constructs continue to operate, even though the conclusions they generate as to the causes and meaning of others' behavior are now very wrong? Does the small town boy or girl continue to trust everyone after moving to the big city?

No, of course not; we do adapt and learn and change our ways of understanding other people. It is a stressful and confusing time, however; our concepts are in a state of flux (see Fiske & Dyer, 1985; also Hayes-Roth, 1977) and what used to be interpreted and understood with little effort (i.e., automatically) now requires concentration and effortful processing. Automatic processes seem to be responsive to new contingencies, and it is likely that a new set of chronic ways of interpreting the social world develops in the face of markedly altered environments, but there is little research on this at present. An important factor in this process, which may determine whether early or previous learning is overridden by new environmental contingencies, is the disconfirmability of the chronic expectation (see Bargh & Thein, 1985; Reeder & Brewer, 1979; Srull, Lichtenstein, & Rothbart, 1985). To the extent the expectation is concrete enough to be clearly disconfirmable (e.g., people can be trusted), the automatic IF-THEN relation (e.g., IF [someone offers to help you carry your bags at the airport] THEN [the person is sincere and helpful]) can be broken. To the extent the expectation is ambiguous and abstract enough that it is not clearly disconfirmable (e.g., IF [someone smiles at you] THEN [it means the person likes you]), it may persist much longer as a chronic interpretive bias.

Even when automatic thought sequences are difficult to disconfirm, for example, as when the natural ambiguity of social events (e.g., the boss walking by without noticing you) permits a wide variety of possible interpretations (e.g., he read my report and hates it vs. he's not wearing his glasses), it is possible to change them. This is the basic purpose of cognitive therapy of anxiety and depression (Beck, 1976; Beck et al., 1979). As with conscious control over any automatic process, the first step is for the individual to become aware of the automatic thought sequences that intervene immediately between an event and the negative emotional reaction the person experiences. By focusing effortful attentional processing on this sequence as soon as the negative emotion (e.g., I'm worthless) is experienced, bringing it into the realm of conscious processing, the individual can develop a new, healthier thought response to the event (e.g., the boss is busy and has lots of things on his mind, it is not personal). Repeatedly catching the negative emotional response and retraining a new, more rational attribution for the event is a difficult and laborious process—as is the breaking of any bad habit (see James's, 1890, example of giving up cigars)—but it is a highly successful therapeutic approach. Automatic processes, in other words, are not necessarily forever.

And the conscious will is not without its own devices in a situation in which the individual wants to do something other than the usual, habitual response. Gollwitzer's (1990, 1993; Bargh & Gollwitzer, 1994) has been concerned with how intentions are successfully turned into behavior; when, for example, we want to actually do what we have meant to but not gotten around to for a long time, or when we want to defeat a known and powerful temptation. Quite interestingly, it appears that the intentions with the best chance of success—what Gollwitzer terms *implemental* intentions—possess many of the same qualities as automatic processes. These are specific environment-behavior linkages (i.e., when X happens, I will immediately do Y) that are likely to provoke the desired behavior later on, when X occurs, without the need for conscious intention or deliberation at that time, and even without conscious awareness that event X took place. In a sense, then, implemental intentions are a form of *strategic* automaticity, an interesting and provocative mix of automatic and controlled processing features. Automatic tendencies, such as bad habits, it seems, can be hoisted by their own petard.

INTERACTION OF AUTOMATIC AND CONSCIOUS PROCESSING

Related to this issue of whether automatic processes can be overridden by new environmental contingencies is the question of how automatic and conscious or controlled forms of processing interact. The adaptation of automatic processes to new environments is really a matter of how conscious experiences (e.g., "Hey, he took my suitcase!") can override automatically suggested interpretations. As noted earlier, Fiske (1989) and Devine (1989) have argued for the ability of motivated conscious, effortful processing to override automatic tendencies when the two are in conflict. This principle, that conscious processing can dominate automatic processes, dates back to Shallice (1972) and Posner and Snyder (1975). There seem to be

two conditions for such overriding, however. A person must have the motivation or intention to think or act differently from what comes automatically, and also have the attentional capacity to support the flexible, relatively unusual thought or action sequence (Bargh, 1989). That both attention and intention are needed for a conscious process to overcome an automatic one is a thread that runs through the "cognitive busyness" research of Gilbert (e.g., 1989), the piecemeal versus stereotypic impression formation research of Fiske and her colleagues (e.g., Fiske & Neuberg, 1990), and the two-stage stereotype activation and utilization work of Devine (1989). Only one more point needs to be added to these considerations: Effortful processing requires that the person (given that he or she has the available attention at the time to support it) be aware of the automatic effect that he or she is overriding; a person who does not know he or she is being affected cannot control the effect (see Bargh, 1992).

The preceding discussion concerns the case in which the controlled and the automatic process are occurring contemporaneously. Often, however, navigation of the social environment involves processes that extend over time. One model of cognitive structure—the *script* model—is specifically concerned with the interaction between automatic and conscious processing over the time span of a social situation.

Abelson's Script Model

Automatic connections between two mental representations develop to reflect regularities of experience. In no model of social information processing is this so apparent as in Abelson's (1980; Langer & Abelson, 1972; Schank & Abelson, 1977) notion of *script*, a mental representation of a social situation as it unfolds over time. The script concept is also based on the principles of autonomous, IF-THEN cognitive sequences. In the case of scriptal representations, these reflect the regularities in chronological sequence of events in common social situations. (Note that "common" social situations are frequently encountered, one of the two prerequisites for automaticity development.) Events that consistently follow the same order result in the development of autonomous associations, such that upon experience of one event in the chain, the next is implicitly assumed to follow, and anticipated with a high probability. In this way, Langer et al. (1978) provided several demonstrations of how the mental readiness to perceive the next event in a standard situation often led to behavior as if that event had occurred when in fact it had not, although the superficial features of the situation had followed the scripted form.

Abelson (1980) argued that scripts were not representations that operated entirely autonomously and without any conscious involvement, however, because they were more complex than that. Instead, scripts were seen as comprising autonomous or ballistic sequences as well as conscious choice points. Those conscious choice points for Abelson reflected moments within the situation in which a single given event did not follow consistently from the one before. Rather, the situation could take two or more paths at that juncture. Because of this, no implicit assumption or expectancy would be generated automatically; without the automatically generated next step of the script, the only way for the individual to comprehend and understand what happens next would be through the use of flexible, conscious, attentional processes.

This more elaborated script, including conscious choice points, illustrates the role of consistency of experience in the development of automatic processing. Automatic processes develop to represent the regularities of experience, to remove the need for conscious involvement in decision-making whenever possible, when it has been proven over time and experience not to be needed.

Abelson's (1980) script model captures the interplay between automatic and conscious processes. Conscious, effortful information processing is expensive. It is the only form of cognition that can handle the unusual and novel. Because automatic processes evolve over consistent and frequent experience, they embed the regularities of the individual's environment into deeply etched grooves of mental life. When our current experience of the environment follows those familiar forms, the implicit scripts and categorizations and other automatic perceptual and cognitive processes handle the operation of the mental machinery with little or no need of conscious attention. When environmental events deviate from those routine patterns, however, no automatic process exists that maps onto them. This situation mechanically results in the recruitment of conscious attention and processing, to attain what Srull and Wyer (1986) recognized as the default cognitive goal—comprehension.

Attentional Salience and Person Memory Effects

Attentional salience effects occur for exactly this simple, mechanistic reason (Bargh, 1984; see also Higgins, Chapter 5, this volume). To the extent an event is usual and experienced before, it fits the individual's existing mental structure for the event or person or situation. Little conscious attention is recruited, therefore, for purposes of comprehending it. To the extent an event does not correspond to the existing structure, conscious attention is therefore needed for comprehension. The greater attention devoted to its comprehension results in its greater memorability subsequently (McArthur, 1981; Taylor & Fiske, 1978). Moreover, the greater effort after meaning necessitated by the lack of a preexisting knowledge structure to handle it means that the individual is likely to form more integrative associative links between the representation of the event and other relevant information stored in memory, further enhancing its later retrievability (Fiske, 1980; Srull, 1981; Srull et al., 1985).

The Activation Threshold Model

Logan (1980) proposed a simple formula to capture this interaction or interface between automatic and conscious processing. Assume that there is a constant amount of mental activation, k, needed to comprehend the meaning of a stimulus—in Bruner's (1957) terms, to categorize it somehow, to activate its corresponding mental representation. Assume also that there are two sources of such activation:

from conscious and effortful attentional processes (A) and from nonconscious, automatic sources (a). Thus,

$$k = A + a$$

To the extent that the corresponding mental representation is *accessible* in memory—either through temporary (e.g., priming, expectancy, current goals) or chronic means—a is larger, and thus A, the amount of conscious attention needed, is necessarily smaller. To the extent that the relevant mental representation is relatively inaccessible—either because the occurrence of that event is unexpected and unusual in that situational context (e.g., the one speaker with a Scottish brogue in a group of Southern U.S. males) or unexpected in a more chronic sense (e.g., behavior that goes against our beliefs about the social group to which the target individual belongs)—the activation contribution a by the internal representation will be negligible and thus greater conscious attention A will be needed to achieve comprehension threshold k.

THE FUTURE: MOVING FROM SOCIAL COGNITION TO SOCIAL IGNITION

The principles of automaticity development, of frequent and consistent coactivation of representations, do not place any restrictions on the particular kind of representations that can develop interconnections. An environmental event or situation provokes many kinds of immediate psychological reactions, creating what Lewin (1935) called the *psychological situation* for the individual (see also Higgins, 1990). Mischel (1973) elaborated on this idea in his social-cognitive theory of personality, arguing that the objective situation as encoded or understood by the individual consists not only of the meanings it has for him or her, and the affective reactions it provokes, but also the behavioral responses associated with the situation including goals and purposes, courses of action (or inaction). Thus, any features of a situation can become automatically associated through frequent and consistent coactivation with those internal perceptions, judgments, feelings, and behaviors. There is, consequently, no *theoretical* or a priori reason to restrict automaticity to social perception or judgment or attribution. Other elements of the psychological situation such as evaluations, affective and emotional reactions, motivations, and even behaviors can also be automatically associated to the situational representation (Bargh, 1997).

This seems to be where automaticity research is heading. Researchers are already exploring whether cognitive motivations—such as to preserve consistency among one's beliefs (Cialdini et al., 1995) or to defend one's important beliefs from persuasive attempts (Chaiken et al., 1996)—can be automatically triggered by environmental events (see Bargh, 1990). It has already been established that nearly all stimuli provoke immediate, automatic evaluative reactions (e.g., Bargh et al., 1996). And recent research has also shown that social behavior itself can be primed automatically by the same manipulations that have influenced impression formation in previous research (Bargh, 1997; Bargh & Gollwitzer, 1994). Automaticity is not limited to social cognition, it can be an important source of social ignition—of motives and behavioral responses—within situations as well.

All aspects of the psychological situation—thinking, feeling, and doing—are capable of automatic activation and autonomous influence. In hindsight, considering the basic Hebbian principles of contiguous activation, this seems almost a logical necessity. We do not perceive or think in isolation or at separate times from feeling and wanting and acting, but all of these, simultaneously. Why shouldn't all the rich and varied reactions we have to social situations—not just perceptual ones—occur preconsciously, and all forms of psychological systems—not just cognition—be capable of operating autonomously once put in motion by an act of will?

Research will also be focused on how these automatic perceptual, evaluative, and motivational responses are intertwined, influencing each other. Osgood (1953) long ago posited that the main reason for the primary importance of evaluation as an aspect of semantic meaning was that it was closely tied to immediate approach or avoidant behavioral responses to the stimulus object. Certainly social cognition and attitude research is based on the premise that social perception and attitude activation are important determinants of subsequent behavior toward the person or object. And the street may well be two-way: How an individual behaves may make it more likely for him or her to perceive similar behavior in others, a possible automatic basis for projection effects (see Bargh et al., 1996; Newman & Baumeister, 1994).

Finally, the discovery of still more sources of automatic influence and direct environmental control over mental and social life is not reason to become fatalistic and to feel our own conscious control is increasingly diminished. Quite the contrary. The more we understand about the ways in which our thoughts, feelings, and behavior are automatic, the better our chances of controlling them ultimately should we so choose. Ignorance here is not bliss, it is yielding control to the environment by default. As has been said before and often, it is precisely those automatic phenomena that we are *not* aware of that we have no chance of controlling. The more we know about the true extent of automatic control over our lives, the better our chances of changing what we want or need to change, and leaving the well enough alone.

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