CONTROL AND AUTOMATICITY IN SOCIAL LIFE

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Topics come and go in social psychology, and this is one that is coming. This is the first *Handbook of Social Psychology* with a chapter devoted to the role of control and automaticity in social life. *Handbooks* have varied somewhat over the years in how they subdivide the field, acting as barometers to measure the relative importance of topics over time—so we are happy to note that this time around control and automaticity have surfaced as key concepts in the way social psychology is being understood.

These are not, however, flash-in-the-pan ideas. The distinction between automaticity and control of behavior has been with us at least since David Hartley remarked in *Observations on Man* (1749) that "The *Motions* of the body are of two kinds, *automatic* and *voluntary*." Notions of control and automaticity have far earlier pedigrees than this, however, in the philosophical study of free will and determinism, and have resurfaced in psychology as fundamental themes in the debates earlier in this century between the cognitivists and behaviorists. Perhaps as a reflection of these foundations, and also for contemporary reasons we examine in this chapter, it now turns out that control and automaticity have developed into mature and important organizing ideas for the understanding of social behavior. The tricky questions of when and how people control their behavior, and the related but not identical questions of when and how behavior occurs automatically, have arrived in scientific social psychology with a bang. In this chapter, we ask these questions and review what is currently known or surmised about their answers.

As a first step in this analysis, we consider the classic studies of the field with a view toward exploring how concerns about control or automaticity of behavior have been historically central to the field. The middle sections of the chapter serve to define the concepts of control and automaticity in greater detail, first by looking at the nature of each idea and then by considering how they are interrelated. The final major section treats the social psychological literature on a series of topics for which issues of control and automaticity have special relevance. These include attitudes, social cognition, emotion, and expressive behavior.

THEMES OF CONTROL AND AUTOMATICITY IN THE CLASSIC EXPERIMENTS

Even with the capricious comings and goings of topics in social psychology considered over time, there is considerable unanimity in what social psychologists currently see as the core ideas of the field. We make this claim on the basis of a small and decidedly nonrandom sample of social psychologists we recently asked to help us identify the field's classic experiments. As it happens, they seem to settle on the same list almost every time.

The studies nominated for this honor usually include Milgram's (1963) obedience experiments, Asch's (1952) conformity studies, Schachter and Singer's (1962) emotion

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experiments, Festinger and Carlsmith's (1959) cognitive dissonance study, the Darley and Latané (1968) helping experiments, and the Haney, Banks, and Zimbardo (1973) prison simulation. There are other extremely classic and wonderful ones, of course, and this particular selection is certainly influenced by our personal taste and age and sex and politics and other shortcomings. We nonetheless suggest it here because these studies are ones that most students of our field will know in some detail, and they serve as useful points of departure for an analysis of control and automaticity in the field as it now stands.

What do these classic studies have in common? This question by itself could occupy an entire seminar on social psychology, as there are many intriguing resemblances and themes. Perhaps the most obvious theme, though, is the emphasis on the situational causation of behavior. As Ross and Nisbett (1991) have reminded us so well, social psychology is the study of situational determinants of thought, emotion, and behavior, and its best-known findings highlight the power and insidiousness of situational forces. These classic studies share a focus on what the individual does when he or she has to decide or respond in difficult circumstances, under extreme duress, unusually quickly, or in an otherwise stressful, uncomfortable position. As a rule, people in these powerful situations don't acquit themselves very well, as they succumb to pressures that make them do things ranging from merely uncharitable to frighteningly robotic.

Classic social psychology, in other words, makes people appear to be automatons. The situational influences on behavior investigated in these studies often were (a) *unintended* on the part of the individual, (b) not something of which the person was *aware,* (c) a response to the situation occurring before the individual had a chance to reflect on what to do (i.e., *efficient*), or (d) *difficult to control or inhibit* even when the person was cognizant of the influence. As it happens, these are characteristics of automatic psychological processes, not of conscious control, and comprise a handy working definition of automaticity (Bargh, 1994). Let's take a quick look at the classics to see how one or more of these features surface in each case.

The Classic Experiments

Consider first the Festinger and Carlsmith (1959) study, in which a participant is asked to mislead another person into believing that a boring task is interesting. Participants themselves come to believe that the boring task is fun as a result, but only when they are paid just a dollar for their deception. Those paid $20 do not change their attitudes. Many later studies showed that such attitude change occurs only when the participant believes he or she has free choice in lying to the other person (Brehm & Cohen, 1962; Wicklund & Brehm, 1976). Thus, it would not have been possible to obtain the original cognitive dissonance findings if the participants in Festinger and Carlsmith (1959) had been *aware* of the power of the experimenter's request in instigating their behavior. Action occurring without awareness was the starting point for this classic finding.

The same issue seems to have come up in Asch's investigations of conformity to group pressure. In fact, Asch (1952) was expressly interested in whether his participants were aware of the sources of their own conformity. He conducted variations of the basic line-judgment paradigm to see if people knew that the majority influence had made them conform, and to see whether they had deliberately or unintentionally abandoned their own private opinions. On the basis of these studies, Asch (1952, p. 182) concluded: "Of significance is the fact that the members lacked awareness that they drew their strength from the majority, and that their reactions would change drastically if they faced the dissenter individually." Thus, in the Asch conformity paradigm, participants also show a *lack of awareness* of the influence that the situation has in determining their behavior.

As part of his obedience research, Milgram (1963, 1974) focused on a different aspect of automaticity. He attempted to document the *counter-intentional* nature of his participants' behavior. For example, he gave a sample of 100 psychiatrists, college students, and middle-class adults a description of the experimental procedure and asked them to predict what they would do in the experimental session, were they to take the part of the "teacher" participant instructed by the experimenter to shock the "learning" participant. All these respondents said that they would stop before 300 volts, and most said that they would stop giving shocks much earlier than that, regardless of the experimenter's requests and demands that they continue. The actual results were quite different, of course; very few of the actual participants in any variation of the experiment disobeyed the experimenter before 300 volts had ostensibly been delivered to the victim. Participants did things, then, that opposed the best estimates of their likely intentions.

The Milgram studies also illustrate the *efficiency* of the processes that lead people to obey. People in these studies obeyed pretty much "on the spot," without a lot of time to reflect on their behavior. When people are given time to reflect, and so can turn over in their minds what they will be doing and what its consequences may be, more effortful and less efficient processes can take over. The effect of this is that people decide to behave differently, and the degree of obedience is actually reduced (Sherman, 1980). Again, then, a classic study illustrates a form of human automatic behavior rather than control.

This is also true of Schachter and Singer's (1962) research on emotion. In their model, a state of physiological arousal produced by situational events becomes experienced as an emotion by virtue of the person's cognitive in-

terpretation of the situational meaning of the arousal. For their research, arousal was manipulated through an administration of adrenaline to some participants but not others, but only some of the participants in each condition were informed of the possible excitatory side effects of this "learning drug." During the experiment, a confederate reacted visibly to the assigned task either with euphoria or anger, and this influenced the mood of the uninformed but not the informed participants. That is, participants lacked awareness of the cause of their emotional experience, and if not supplied with a cause by the experimenter, used the confederate's emotional expression as a cue as to how they themselves felt.

Although neither Schachter and Singer (1962) nor Schachter (1964) remark on the awareness or intentionality of this interpretive process, the tenor of their analysis is that people are actively and intentionally looking at the situation and its features and using these to construct the meaning of the physiological state that they are experiencing. However, Schachter and Singer (1962) did not ascribe to people any great degree of accuracy or sensitivity in detecting the true source of the emotional reaction. (Indeed, Schachter's [1964, p. 79] discussion of the source of emotion labels closely followed Skinner's [1953, chap. 17] analysis concerning one's lack of access to the cause of private, internal events.) If people were generally *aware* of the true reasons for their emotional state, it would not have been possible for Schachter and Singer (1962) to move the reported subjective experience around by virtue of how the experimental confederate reacted to the same situation.

Were participants in the Darley and Latané (1968) experiments on bystander intervention aware of the effect that the number of people present had on their likelihood to help? The authors addressed this question by asking all participants whether the presence (or absence) of others had affected their decision to help or not to help. Although all participants reported being aware of the presence of others, they nonetheless did not feel that it made any difference to their behavior (Darley & Latané, 1968, p. 381). In fact, this very *lack of awareness* was taken as a sign of hope by the authors that things could be different, as they ended their article on this optimistic note: "If people understand the situational forces that can make them hesitate to intervene, they may better overcome them" (p. 383). In these studies, it is also clear that participants were behaving in a rushed, impromptu fashion, and thus needed to rely on *efficient* rather than time-consuming judgment processes.

The final classic study we consider is the Haney, Banks, and Zimbardo (1973) prison simulation study, in which the basement of the Stanford psychology building was turned into a mock prison that nevertheless became quite real for its occupants. Randomly assigned to the role of guard or prisoner, participants were so *unable to control or inhibit* the powerful effect of their assigned role that they seemed to forget that it was only an experiment that they could leave at any time. When told they were eligible for parole, 60 percent of the prisoner participants said they would forfeit all money earned for participation in order to be released, oblivious to the fact that as participants in an experiment they could have left at any time if they were willing to forego payment. This study is known for its demonstration of the transforming power of the guard and prisoner roles on the personalities of the participants, turning them into sadistic or servile creatures, respectively—behavior that ran *counter to the participant's intentions* as to how to behave in that situation, as assessed by self-report personality inventories and the participants' responses during the lengthy debriefing process. The participants reported regretting their inability to inhibit the responses to the situation, both as guards and as prisoners.

The classic experiments all seem to highlight a basic conflict between the automaticity of behavior and the desire to control it. In each case, we find people behaving in ways they do not seem to control, but which are at the same time so morally reprehensible or just plain blockheaded that they cry out for control. Participants in these studies believe their own hypocritical lies, make patently dishonest judgments in order to conform, obey instructions to hurt others, blindly mimic others' emotions, ignore the plight of people in distress, or adhere slavishly to assigned roles. They seem to be led almost casually out of control. Each classic experiment is a morality play in which Everyperson is led astray by his or her unwitting susceptibility to social influence, lapsing into unaware automaticity at the precise juncture when conscious control seems so important. The haunting suspicion that people should "know better" appears everywhere in the classics, and it is this fundamental observation that fuels much of the social psychological interest in the nature of control and automaticity.

The Experimental Control of Personal Control

In a way, this had to happen. An emphasis on automaticity is a natural result of the social psychological desire to observe *genuine!* behavior. Researchers don't want to be fooled by a participant's self-presentations or deceptive motivations, and in the pursuit of genuineness, they restrict the focus of the experiment's microscope to items that the person couldn't control or even be interested in controlling. Behavior that occurs without an individual's awareness, or that occurs quickly, unintentionally, or uncontrollably, after all, seems to have a stamp of genuiness on it—it is the *real* response to the situation, not just something the person has devised for the experimenter's amusement or misdirection. In the attempt to rule out these strategic explanations, experimental social psychology's special brand of "princi-

pled argumentation" (Abelson, 1995) emphasizes automaticity with little room for control.

In fact, research specifically attempting to rule out control or strategic activity of any kind must often create unusual and extreme behavior settings to make sure control is not happening. Studies attempt to rule out control by blocking participants' awareness entirely (e.g., by subliminal stimulation), for instance, or by seriously crippling the participants' expenditure of effort on inefficient mental processes (e.g., by imposing mental load or time pressure). Researchers have tried to ensure that the behavior they observe in participants is so unwanted that it couldn't possibly be intentional, and they delight in producing situations that have such profound influence on participants that the participants cannot inhibit the behavior even when they deeply desire to do so. Only when stringent experimental controls of personal control are imposed, in other words, do participants show behaviors that can be classified as truly automatic (Bargh, 1989; Wegner & Pennebaker, 1993).

In one sense, these observations suggest that contemporary social psychology is a science of automaticity, not control (Bargh, 1997; Howard & Conway, 1986). The evidence accrued in the classic experiments and their progeny points regularly to situational causes of behavior that participants had no ability or opportunity to control, and that therefore seems irrelevant to the nature of control processes. In another sense, though, this massive scientific effort aimed at the prevention of control processes in the pursuit of forms of automatic behavior suggests that control processes themselves must be profoundly powerful indeed. The entire edifice of social psychological experimental method strains to extinguish the gleam of control in even the most tightly shuttered experimental closet, and still control shines through here and there.

Control also shines through in the classics. After all, it is not the case that the behaviors people performed in these studies were all done with perfect automaticity. The behaviors were certainly not *all* performed without any awareness, while at the same time occurring efficiently, unintentionally, and beyond inhibition. Rather, one or the other of these aspects of automaticity was created in the experiment for a time, and this disabling of control was enough to allow the experimenters to conclude that the observed behavior was a genuine response to the situation. In all likelihood, people in these studies were quite in control of *some* behavior in the experiment, just not the one of interest to the experimenter. Participants in a conformity experiment may have been trying desperately not to look silly to the other participants in the room, for example, whereas those in an obedience study may have been working hard consciously to control their emotions as they dealt with the conflicting pressures they were feeling.

Control processes were evident in the classic experiments when participants accepted instructions on what to do—and then did what they were told. This seems a pedestrian observation indeed, but its apparent subtlety masks its considerable importance. The fact is, people participating in the classic experiments were almost always conscious of an intention, following a plan, putting forth effort in thinking about some aspect of their activity, and inhibiting or controlling certain behaviors. Social psychological research has long depended on the ability of people to do many different things in response to instruction, even though it is only recently that the person's instructed performance has come to be understood as a key focus in the study of control processes (Wegner & Pennebaker, 1993).

What this means is that control is not absent in the world at large just because researchers are interested in aspects of behavior that are automatic in experiments. Instead, it makes sense to understand human behavior in experiments and elsewhere as consisting of elements of both automaticity and control. As we shall see, the broader part of behavior in social situations is governed by a welter of automatic processes, many of which do end up yielding exactly the kinds of mindless gestures recorded in the classic experiments. Against this backdrop of automaticity, however, there is also an important, powerful thread of conscious control. Psychological processes that are simultaneously open to awareness, intentional, inefficient, and able to be inhibited do exist, and are linked together into the chain of our waking social lives.

The nature and interplay of these control and automatic sources of behavior are matters of continuing discovery in our field. Because experimental social research has dug the idea of control into something of a hole, we begin our excavations in the analyses that follow by considering control first. As we shall see, it turns out that the idea of control is down in that hole because it is the foundation concept on which an understanding of automaticity stands.

THE NATURE OF CONTROL

Psychological control is a mental process that produces behavior. We begin in this section by considering first the scientific status of control. Then, we turn to the key elements of control in human and other systems. Next, we explore the larger problem of locating control processes in conscious life and considering how it is that consciousness can be said to control behavior. We then examine the *sense* of control to distinguish it from control per se and to review its separate psychological consequences.

Science and Control: From the Ghost to the Machine

The control of behavior strikes some people as mysterious, like ESP or crop circles. This is because behavior that is controlled is frequently understood to be the opposite of be-

havior that is determined. In this view, control is what is left over once the scientific analysis of behavior is completed. As we have seen, the strategy of classic research in social psychology has often been to limit or circumvent the operation of voluntary or control processes with a view toward discovering those automatic forces that determine behavior. In this way of thinking, it seems that the best role left over for a concept of control is as some kind of homunculus—an agent, spirit, or magical entity that has the special property of *being able to do things that are not caused.*

Consternation over this kind of control has troubled psychologists and philosophers alike, and the whole study of goal-oriented activity on the part of humans has carried on under something of a cloud as a result (Wegner & Vallacher, 1987). The philosopher Gilbert Ryle (1949) referred to conscious control as "the ghost in the machine," for example, and dismissed the theory of psychological control as inconsistent with the causal determinism of behavior. He reasoned that the ghost is unnecessary if all it does is haunt the machine that actually churns out everything the person does. And even if the ghost could have an influence on the machine, Dennett (1984) has observed that this hardly provides a kind of free will worth wanting. A controller whose primary activity in life is doing things that are not caused by prior events seems no more than a capricious imp one would not trust with a water balloon.

Why then retain the concept of psychological control? For one thing, most people have an unshakeably insistent sense that they control their behavior in accord with their conscious thoughts and attitudes, and this should not be ignored as long as we hope to continue to stay on speaking terms with the human race. More important, though, is the realization that control is not the opposite of determinism. The way in which people control their behavior is no less determined than the way in which their automatic behavior occurs. Control is merely one conduit by which the determinants of behavior express their influence. Far from the ghost in the machine, then, the process of control is a particularly interesting *machine* in the machine.

This approach may strip away the mystery of control too completely, leaving it naked and squinting in the light. The sense that we humans cause our actions is indeed compelling, and any analysis that offends this sense runs the risk of prompt rejection. We believe that this sense or feeling of control is not good evidence that the ghostly form of control exists, however, as there are people who sense that they control the rotation of the earth and that certainly doesn't mean they do. The sense of control is itself an intriguing property of humans that can be conceptualized as an effect and as a cause of deterministic processes. As we shall see, there is much to be gained by viewing psychological control simply as a process that produces behavior, a process that has certain fundamental characteristics no matter whether the behavior issues from humans, animals, plants, or machines. (Ghosts, however, need not apply.)

The initial discovery that control in humans could be studied in this way is widely attributed to Norbert Wiener's (1948) *Cybernetics,* a book that introduced a computational approach to the problems of control—although glimmerings of the idea are also found in Craik (1948). The use of self-guiding mechanisms had swept the field of engineering in the years just before and after World War II, and it was a natural next step to consider how such control systems might model human thought and behavior (Heims, 1991). Simple mechanical gadgets such as the thermostat, the engine governor, and the logic circuit could be given goals (e.g., 72 Fahrenheit, 2400 RPM, "True"), and they could then regulate the behavior of systems such that those goals could be met. Although it seems perfectly natural now to describe humans as intelligent machines containing control systems, this was a revolutionary idea at the time, as it broke down many of Ryle's and other behaviorists' objections to the study of a "ghost" that behaved in accord with unobservable purposes and goals. Eventually, this breakthrough produced a large literature on control in humans, and it is to the elements of such control that we turn next.

Elements of Control

At the most basic level, to control something is just to influence it in a certain direction. A hat controls hair, for instance, and a person holding a leash controls a dog. We don't usually call influence "control" when its direction is random or unknown. So, for example, we wouldn't say that a tropical windstorm controls hair or that a roomful of humpable knees controls a dog.

These intuitions about the everyday meaning of control coincide well with formal analyses of the elements of control, as such analyses typically begin by distinguishing two features of control—a *control action* (the influence) and a *control criterion* (the direction). Control involves acting upon something until a certain criterion is reached. In the case of the hat, the control action is rather static, as the criterion involves simply keeping the hair from escaping. The case of walking a dog on a leash illustrates dynamic control, in turn, as the criterion might be to get the dog moving toward the park and the action might involve pulling at the leash while the dog leans hard toward something that smells interesting.

Control theories also make a general distinction between the input and output of a control process. The *input* to a control process is information from outside the control system that sets the criterion. The desire to "keep my hair down" might be thought of as the input when a person puts on a hat, whereas the person's desire to "walk the dog to the park" might be thought of as the input in the case of the

person walking the dog on the leash. What the hair or the dog does, in turn, is commonly called the control system's *output.* The output is the behavior of the target of control.

There is a distinction between open-loop and closed-loop control in engineering that is particularly important for psychology. An *open-loop* control system (also sometimes called a *feedforward* system) is one in which the control action is independent of the system's output. So, for instance, a timed microwave oven is an open-loop system because the action (microwaving) is set to a criterion (say, 4 minutes for microwave popcorn) and doesn't change as a result of the system's output (the temperature or doneness of the popcorn). A *closed-loop* control system (also called a *feedback* system) is one in which the control action is somehow dependent on the system's output. Some ovens come with an attached meat thermometer, for example, that can be inserted in a roast and that will turn off the oven when the meat reaches a preset temperature.

Although a meat thermometer may not quite capture the excitement we were hoping to create here ("C'mere, everybody! Look what they're writing about now!"), we wish to emphasize that closed-loop control is important for conceptualizing human self-control of behavior. This is largely because closed-loop control is more effective than open-loop control in any circumstance in which there is variability—and life throws lots of variability our way. Microwave oven popcorn is notoriously variable, too, for instance, so it is no wonder that when we only get to set the cooking time (an open loop) we end up sometimes with unpopped kernels and others with a bag of cinders. Occasionally the instructions on the bag will tell us to listen for the number of pops per second late in the time interval, and this adds a measure of closed-loop control to the system that can up our hit rate on decent popcorn. But really, it would be nice to have a microwave with a popcorn doneness sensor and enjoy closed-loop control all the time.

Open-loop control can be thought of as control that begins with a very specific plan, and then sticks to it. This kind of control involves starting off with the control criterion already set, and then not checking again to see if the control criterion is being met. Open-loop control is what we humans do when we must behave very quickly or when there's no chance for adjustment, and it probably also corresponds to the starting point of many of our behaviors. When we set out to do something, after all, we don't just begin blindly doing anything at all and then check to see whether that random act got us any closer to the control criterion (Carver & Scheier, 1990). We begin with a launch plan of sorts. Open-loop control, in this sense, is more characteristic of an automatic process than a control process, and there are many automatic processes that function just to "launch" behavior in this way, with no further steering or guidance. What this means is that the *essence of control is the closing of the loop,* the connection between the system's control action and its prior output. In contrast to automaticity, control involves making adjustments to the output through further control action when prior outputs haven't met the control criterion.

The idea that controlled human behavior stems from closed-loop control systems has appeared in a variety of psychological theories. Perhaps the best-known feedback theory in psychology is the test-operate-test-exit or TOTE unit introduced by Miller, Galanter, and Pribram (1960; see Figure 1). These theorists proposed that the influence of plans on human behavior could be modeled by a control system that exerts control actions to reduce the incongruity between a behavioral output and a control criterion. The TOTE sequence (1) tests for the degree to which the output is consistent with a control criterion, (2) operates a control action to increase congruity with the criterion, and (3) tests again for the degree to which output matches the control criterion. If it doesn't match, the control action is initiated again (2), but if it matches, then (4) the loop is exited. A TOTE unit of this kind provides a general way of understanding how people might control behaviors all the way from hammering a nail into a board through getting a Nobel Prize. In essence, every such behavior involves multiple iterations of two events: doing something and checking to see whether what was done achieved the goal.

Although we commonly think of control in terms of the "operate" function—after all, that's the part of control that actually supplies influence—the "test" function of the TOTE unit reminds us of the other important element of control: the *comparator* or *monitor* (Powers, 1973). For successful feedback, some comparison must be made between the control system's output and the control criterion. If one is trying to impress the boss by stamping out the answers to math problems with one's foot, for example, it would be nice to know whether one is in fact making a good impression. A monitoring or comparing process must somehow be built into any control system such that the control action will occur whenever there is a discrepancy. The monitor learns of the discrepancy and "feeds back" by initiating the control action.

Control has been described in a different way by Newell and Simon (1972) in terms of what they call production systems—control systems that operate through a series of conditional or if-then statements. One could write a computer program to get a robot down the street, for example, with statements in it such as "if the traffic light is red, then stop," "if the traffic light is green, then go," "if going and right foot on pavement, then step with left foot," and "if going and left foot on pavement, then step with right foot." A list of such statements could be reviewed repeatedly such that when any "if" turns out to be true, the associated "then" is produced. The program's repeated review of these conditional statements is continually "watching" for each of the conditions, monitoring the relation of the robot

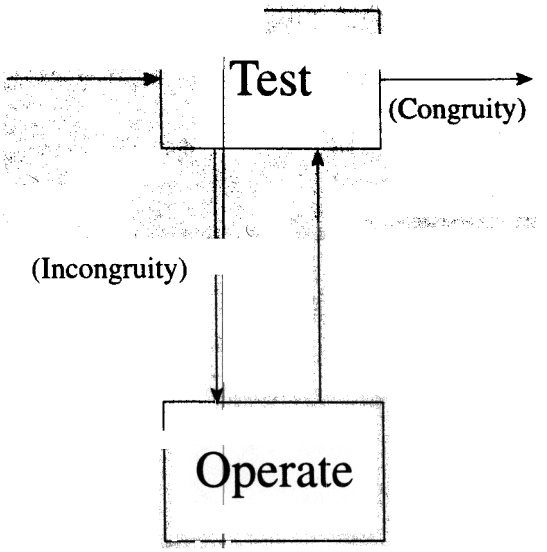

FIGURE 1 A TOTE Unit.

to the environment to determine whether each control action should be taken. The production system is monitoring the robot's progress.

In a sense, then, control involves constant or repeated vigilance, a kind of self-consciousness or self-knowledge that is wired into the control system. The test process is more than a mere error-checker, in this light—it is the critical element that creates the "loop" whereby the system is influenced by its own past actions. Any system that is reflexive in this way has special properties that make it fundamentally more adaptive (and unpredictable) than systems that do not (Hofstadter, 1979). The scientific study of nonlinear dynamical systems and chaos (Gleick, 1987; Vallacher & Nowak, 1994) involves the mathematical description and understanding of just such reflexive systems.

It may have been the resemblance of this reflexive feature of control to the self-awareness people feel in social situations (Duval & Wicklund, 1972; Wicklund, 1975) that inspired Carver and Scheier (1981, 1990) to introduce a general theory focused on the role of self-awareness in the control process. This theory suggests that the adjustments people make in their social behavior arise because self-attention prompts people to reduce discrepancies between their actual behavior and standards of correctness. Noticing that one is not being as helpful as one would like to be (Duval, Duval, & Neely, 1979), for example, or as aggressive as one would hope (Carver, 1975) or as unprejudiced as one would prefer (Macrae, Bodenhausen, & Milne, 1995), all involve monitoring how discrepant one's behavior is from a control criterion. Experimentally increasing self-focused attention beyond its natural levels enhances control in each of these cases, and this points to the crucial role of the monitoring process in the occurrence of control.

A final important element of control processes is the setting of the control criterion—how the control system's input is achieved. When we set a thermostat to a particular temperature and let it control the furnace, for example, we provide the input to the system by giving the thermostat a control criterion. The question of how criteria are set for human control is sometimes just this simple; our commanding officer in the military may set us to "march" or to "shoot" and we may accept that input without question (Milgram, 1974). Miller et al. (1960) suggest, too, that this is how hypnosis operates. The control criterion is set by the hypnotist and the hypnotic subject then acts as a control system seeking that criterion. Environmental reminders can suggest control criteria to us when we are not hypnotized, of course, and so set us toward the purposes they suggest (Bargh & Barndollar, 1996; Bargh & Gollwitzer, 1994).

Sometimes people set their control criteria themselves. When we choose without any obvious external urging to go to college or to take up selling drugs, for example, it could be said that we have set our own control criteria. Carver and Scheier (1981) and Powers (1973) have suggested that the setting of such criteria is the output of a prior control system, and that it is thus possible to imagine a hierarchy of control systems in which the outputs of those above provide inputs for those below. The development of conscious plans to behave, in this light, is the output of a control system that selects from among different alternative actions, perhaps in accord with broader principles or values. The person who chooses college over selling drugs may do so

because of a higher-order control system with a control criterion set to "be good."

Choosing states of mind may follow this pattern as well. Wegner and Wenzlaff (1996) propose that such *mental control* involves a *mental state selection process* that functions to set us in pursuit of particular mental states. So, for instance, when we get it in our heads that we want to avoid thinking about an old flame, that we want to fall asleep, or that we want to stop being angry, these goals are often set for us by a higher-level process that decides that a certain mental state would be good in our particular situation. Although we may experience a variety of mental states just because they are elicited automatically by our environments, we can also intentionally control them when control criteria are set that institute mental states as goals.

Knowing whether an input to a control system comes from inside or outside the person may ultimately be less important than knowing simply what it is. As it turns out, inputs to control systems can occur *under different descriptions,* and this turns out to be particularly crucial for understanding how actions are launched and how they are then monitored. Actions can be identified at various levels, stretching from low-level details to higher-level purposes or effects (Vallacher & Wegner, 1985, 1987; Wegner & Vallacher, 1986). Someone who "shoots a person," for example, can also be said to have done what might be identified at lower levels as "moving a finger" or "pulling a trigger." The act might also admit to higher-level identities such as "protecting oneself" or "getting into trouble" or "committing a crime." Clearly, unless control processes for action are incredibly complex and somehow anticipate the many ways in which an act can be identified, the input to such a process is likely to be just one of these act identities, not all. In this sense, any control process is rather single-minded, focusing on the production of only a very circumscribed effect.

In summary, the elements of control in psychological theory center on the description of the closed-loop control or feedback system. Such a control system changes something (produces output) by performing an operation (a control action) whenever it is discovered (by a monitoring process) that there is a discrepancy between the system's output and a desired state (a control criterion). The system's input sets the control criterion, and this can come from many possible sources including the environment and other control systems.

Conscious Control

The control processes we have encountered thus far don't really distinguish our mental operations from those of a very elaborate household appliance. To go to the next level and become really human, we need to add another feature that is at once immense, confusing, exciting, wondrous, and, to some commentators anyway, possibly useless—consciousness. Intuitively, after all, most people think of control in humans as conscious control, so much so that the term "unconscious control" doesn't seem right at all. To begin understanding the role of consciousness in control we need to examine consciousness itself.

Consciousness A useful way to approach the analysis of consciousness is to distinguish conscious mental states from other mental states. A mental state may be said to be conscious when it is accompanied by a roughly simultaneous but higher-order thought *about* that very mental state (Armstrong, 1980; Rosenthal, 1993). So, for example, the conscious experience of pain involves more than the simple registering of a painful sensation in the mind. It includes a parallel realization that one is having this sensation, a thought that "I am feeling pain." Some commentators even describe this distinction in terms of separate parts of the brain, one of which is focused on some item of mental content, and the other of which is focused on the fact that the first is focused on that item (e.g., Gazzaniga, 1988; Jaynes, 1976). Others suggest that the important characteristic of consciousness is that the self becomes involved; sensations and actions come to have an author, the "I" (Dennett, 1991; Kihlstrom & Tobias, 1991).

The main idea here is captured with a distinction between two sorts of consciousness. The more rudimentary sort is what Armstrong (1980) calls *minimal consciousness*—just what distinguishes mental activity from mental passivity. A person is minimally conscious if the mind accepts inputs such as sensations and produces outputs such as behavior—in other words, it is not unconscious. One can infer that even a sleeping person is minimally conscious when, say, one prods the person in mid-snore and the person turns over. It is easy to think of animals as having this sort of consciousness, and this is probably the kind of consciousness many of us enjoy for much of what we do on a daily basis. Although such "reactivity" (Jaynes, 1976) is no more sophisticated than what plants do when they turn toward the sun, it is a beginning. We are plugged in to the world, a big step above comatose. But this is not full consciousness.

In *full consciousness,* a stream of higher-order thoughts carries on in parallel with one's (minimally conscious) mental or physical activities. As one thinks in turn of, say, one's fingers moving at a computer keyboard and then the music playing in the distance, there is the parallel presence of a higher-order thought of the fact that one is minimally conscious of each of these things ("I was typing along and then I heard the lilting strains of yonder flugelhorn"). This is something that the garden-variety houseplant can never enjoy, no matter how vigorously it turns toward the sun

each day. Full consciousness introduces thoughts *about* what we are thinking and doing. Such higher-order thought is not always present. One's finger could move at the keyboard and one could respond to the music (perhaps by baying softly), quite without full consciousness, as the mind normally carries on many such activities without making us think of the fact that it is doing them. When full consciousness does occur, however, the mind is occupied not only with the keyboard and music, but simultaneously carries on a stream of thought about the fact that it has each of these occupations in turn.

The observation that full consciousness can come and go, visiting some of our minimally conscious activities and skipping past others, has long been appreciated by psychologists. Jastrow (1906) remarked on the common experience of performing some routinized action and finding one's mind wandering away from the act, only then to "come to" and realize that for some time one has been unaware of what one was doing (see also Carpenter, 1874). Such a return of full consciousness can also occur on purpose, and this corresponds to "introspective" consciousness (Rosenthal, 1993). Like full consciousness, introspection involves higher-order thoughts about one's acts of minimal consciousness (Nisbett & Wilson, 1977). In introspection, however, the higher-order thoughts are intended, whereas in normal full consciousness the occurrence of the higher-order train of thought seems unintended.

Full consciousness also seems to have a special connection with language. We don't normally talk about or describe mental events of which we are minimally conscious. The mental events that are fully conscious, on the other hand, are quite readily narrated in language—so readily that it seems that such narration may somehow be a fundamental part of the way in which we become fully conscious (Dennett, 1978). Although we may sometimes have trouble putting our fully conscious contents into the *right* words, we are never doubtful of the possibility that we can put them into *some* words. Part of what happens when we reach the higher-level thoughts about our minimally-conscious contents may involve the translation of the experience into a sequential form that allows it to be rendered in language. In this vein, Dennett (1969) made a distinction much like the one between full and minimal consciousness in which he suggested that being **aware**$_1$ (a verbalizable awareness) is not the same as being **aware**$_2$ (a mere connection with stimulation that causes behavior). Speaking yet more broadly, it may be that the role of consciousness in translating the parallel, time-unbound workings of the mind to the demands of a serial, sequential outside world transcends language per se. Serialization is a property imposed on all responses to the environment (such as actions) which must take place one at a time (see Bargh, 1997; Lashley, 1951; Shallice, 1972; Vallacher & Wegner, 1985), and this seems to be an important part of what full consciousness does.

The leap from minimal to full consciousness has been explained in another related way among developmental psychologists studying the child's "theory of mind" (Astington, Harris, & Olson, 1988; Leslie, 1987; Gopnik, 1993). Researchers in this tradition have observed that children experience a transition during the ages of three to four in which they become capable of thinking about their own mental states and those of others. Before this, a child might report after discovering that a candy box contained pencils, for example, that he or she had always thought it contained pencils and had never held the mistaken belief that it held candy—even though this was clearly the case. Similarly, the child might attribute knowledge of the pencil contents to another child being shown the closed candy box for the first time. This apparent extension of what the child knows now into answers about what the child knew before or about what other uninformed children know now suggests an inability to represent mental contents as independent of reality. This basic ability would seem to be necessary for the operation of the higher-order thinking associated with full consciousness. In this light, full consciousness is something we gain when we develop the capacity not just to have mental states, but to think and talk about them.

With this understanding of consciousness, we can now turn to the question of conscious control. Our analysis of consciousness into two forms suggests that some proportion of a person's control processes may carry on with only minimal consciousness, whereas the remaining control processes have full consciousness. In what follows, we will use the term "conscious control" to refer only to the case of full consciousness.

To examine conscious control, we must be careful to specify *when* the consciousness of interest is occurring. Conscious processes can occur (1) well in advance of behavior as we think, plan, or deliberate about what we will do, (2) in the form of conscious intention that appears in mind just before the behavior occurs, and (3) during a behavior as we consciously notice aspects of the enactment. To keep these epochs of consciousness straight, let us call them *conscious planning, conscious intention,* and *conscious monitoring.* Each of these points of conscious contact with control is worth considering separately.

Conscious Planning There seems to be little doubt that work done in the mind, and of which we are fully conscious, can contribute importantly to subsequent control of behavior. Although full consciousness of goal selection and behavior planning may not be a necessary requirement for cognitive control of behavior (Bargh & Gollwitzer, 1994), it is often sufficient. Conceptualizations of conscious planning usually divide it into two kinds of processes (Miller et al., 1960; Vallacher & Wegner, 1985), each of which has attracted considerable research attention. One set of conscious processes deliberates among multiple possible goals of action (e.g., Carver & Scheier,

1990; Higgins, 1987; Markus & Nurius, 1986; Mischel, Cantor, & Feldman, 1996; Powers, 1973; Vallacher & Wegner, 1985). Another set of conscious processes creates or retrieves courses of action to achieve a given goal (e.g., Abelson, 1981; Bower, Black, & Turner, 1979; Gollwitzer, 1993; Graesser, 1978; Schank & Abelson, 1977). In terms of control process language, these two emphases focus, respectively, on the control criterion (what to do) and the control action (how to do it).

These conscious planning processes appear to build the pathways for future action, but they do not seem to compel the action to occur. A person may well have thought through several potential goals and selected just the right one, for instance, and then have considered in detail how to behave so as to achieve that goal, but still just not do it. In this sense, conscious planning is preparatory rather than inevitably effective in producing controlled activity. This remarkable wobbliness in the causal linkage from planning to acting is clear to anyone who has lain in a cozy bed too long in the morning, uselessly resolving again and again to get up—a fact observed early on by James (1890, Vol. 2, p. 524). Much of the research on conscious planning has focused on this tenuous link (see Baumeister, Heatherton, & Tice, 1995; Fiske, 1989; Gollwitzer, 1993; Mischel et al., 1996), as this seems to be the central impediment in the path to self-control. It has been learned, for example, that conscious planning is more likely to compel action when it is detailed and includes reasons for action (Ajzen, 1991), when planned identifications of what will be done match the person's ability to act (Vallacher & Wegner, 1987), when the initiation of plans is linked to specific future environmental events (Bargh & Gollwitzer, 1994; Gollwitzer, 1993), and when conscious images of the action have been formed (Anderson & Godfrey, 1987; Feltz & Landers, 1983). Still, the specific moment of the transition from conscious plan to action remains somehow outside of conscious control. As we shall see, this seems to occur because conscious intentions are not the causes of action we had always hoped them to be.

Conscious Intention After planning, the next point at which consciousness parallels control processes is in the conscious intention to behave. An interesting approach to the role of conscious intention is suggested by the work of Libet (1985). His studies have focused on the prior finding that a "readiness potential" (RP), a scalp-recorded slow negative shift in electrical potential generated by the brain, begins up to a second or more before a self-paced, apparently voluntary motor act (Gilden, Vaughan, & Costa, 1966; Kornhuber & Deecke, 1965). In studies of spontaneous, intentional finger movement (e.g., "Please move your finger voluntarily and intentionally at some point in the next few minutes"), Libet found this RP preceded the occurrence of finger flexion (measured electromyographically) by a minimum of about 550 milliseconds. This finding by itself suggests simply that some sort of brain activity reliably precedes the onset of voluntary action.

The twist that Libet added here was to attempt to measure the point in time at which the person has conscious awareness of the intention to act. He asked participants whose RPs were being measured to recall the spatial clock position of a revolving spot at the time of their initial awareness of intending or wanting to move their finger. It was found that the awareness of intentionally acting *followed* the RP by about 350–400 milliseconds. So, although the conscious intention regularly preceded the actual finger movement, it occurred well after whatever (unconscious) brain events were signaled by the RP. He was careful, too, to subtract the time it took people to monitor the clock—so it appears that conscious intention to act follows the RP and precedes the finger movement.

The implication here is that consciousness is somehow sweeping up after (or at best during) the parade, not setting it all in motion. The consciousness of voluntarily acting appears to occur after brain events that cause the action. This finding remains controversial, as reflected in a variety of commentaries published with the Libet (1985) paper. However, at some level Libet's findings are exactly what we should expect. If conscious intentions popped into mind without any prior brain activity, nothing but a ghost-in-machine theory could predict when we would perform voluntary actions. Consciousness occurring before any brain event would be spooky indeed. If, however, conscious awareness of intention follows brain events in this way, the mechanistic determinism of voluntary action is preserved.

This sequence of events also suggests why we perceive that our conscious intentions cause our actions. The brain events associated with the RP probably produce *both* the conscious intention and the observable action in sequence (see Figure 2). Because we become consciously aware of anything at all in this sequence for the first time just when the conscious intention occurs, and this intention is then typically followed by the action, it makes good sense that we would develop the strong impression that the conscious intention was *causing* the action. This impression could lead us, then, to suppose that we are agents who knowingly cause our acts. The sense of conscious control of action could arise because both conscious intent to act and the action itself are reliably produced, in that order, by unconscious prior brain events.

This analysis should not be read to say that conscious thought plays no part in the voluntary control of action. To the contrary, it is clear that Libet's participants were verbally instructed to move their fingers "at some time," and so were already fully conscious of the plan to move in advance of the moment at which the spontaneous intent to move "now" came to mind. Participants in Libet's experiments were consciously aware in a general sense of what they were going to do in the situation, and were merely waiting for a conscious intention to act to come to mind. In

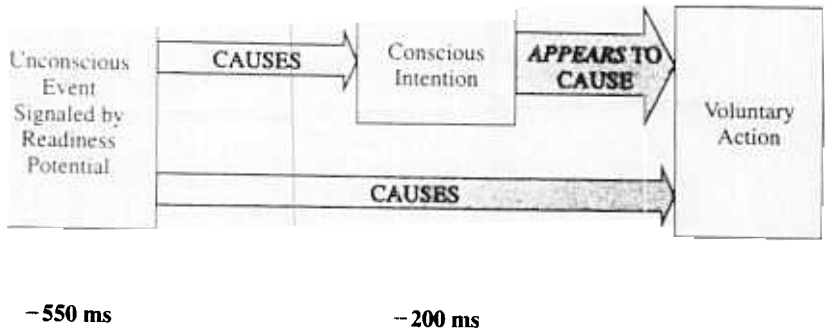

FIGURE 2 Real and Apparent Paths of Action Causation.

a sense, they had intended to intend. Conscious control, then, may involve considerable influence by prior consciousness (in the form of planning and anticipating when actions should be done), but apparently little influence by immediately-prior conscious intention. Consciousness indicates the direction in which voluntary action is being launched, but the momentary conscious intention does not participate in the actual launching.

The key question for this analysis is, of course, why one would want such a system (cf. Harnad, 1982). Why would it be useful to have a control system that can be prepared for action by prior consciousness, but that produces momentary conscious intentions to act that are not necessarily themselves causal of the act? There are at least two suggestions of functions such conscious intention may serve. For handy reference, we can call them the *responsibility hypothesis* and the *criterion hypothesis.*

The responsibility hypothesis has been long suggested by both social scientists (Mead, 1934) and moral philosophers (Hart, 1948/1949; Feinberg, 1970), and appears as well in current social psychology (Fiske, 1989; Uleman, 1989). The idea here is that we become conscious of our intentions so that the social rewards and costs for our actions can be calculated, both by ourselves and others. This notion hinges on the observation that responsibility is allocated in social life on the basis of our intentional social actions, and that our sense that we "could have done otherwise" allows the distribution of social outcomes for what we did do. We humans develop self-conceptions as agents based on the actions we knowingly and intentionally perform, and then expect and receive social recognition for what we have done and the selves these acts represent. This explanation suggests, in short, that conscious intentions are the currency by which we compute who's been bad and good. This social function presumably has become so pressing that it has created the mental processes that report our intentions to consciousness. This is an evolutionary hypothesis, then, that suggests a long process of development of the human ability to foresee our actions.

A second explanation for why we have conscious intentions is the criterion hypothesis. This is the suggestion that intentions alert consciousness to what we are going to do so that the conscious monitoring of our actions and their outcomes can occur. If we didn't know what we were intending, after all, we wouldn't be able to know whether our intention had been successfully achieved. Vallacher and Wegner (1985, 1987) and Wegner and Vallacher (1986) spelled out this idea in the theory of action identification, suggesting that each person has a specific, verbalizable notion of what he or she is doing available for report during any moment of full consciousness. In other words, the question "What are you doing?" posed to a conscious person always has an answer.

In this view, the intentions that arise in mind as we act inform us consciously of what to watch for in our behavior—and so of what can be counted as completion of the action. When we find ourselves waving a hand in a restaurant, for example, it would be good to know whether we are "signaling the waiter" or "cooling off our fingers." This allows us consciously to observe when the action is finished and whether it is successful, and so to discern what to do next (or whether to do it over). When intentions are understood consciously in advance of action, they allow a constant conscious representation of action to accompany the action and serve as a guide to its proper construction. Conscious intention thus allows conscious monitoring (our next topic) and provides for updates of conscious planning—so to allow action to unfold with the benefit of feedback processes.

To summarize, we should note first that our conclusions about conscious intention in this section are preliminary ones. Libet's research, in particular, has not been followed up by enough other researchers to allow us to draw strong conclusions. But at this point, the implication is that conscious intentions signal the direction of action—but without causing the action. Although the trajectory of controlled action is specified in advance by conscious planning, it appears that the precise brain events that trig-

ger the action may precede conscious intention. The role of conscious intentions, then, may be to serve as signals of what we will do. These conscious intentions may serve as socially-driven indicators of our responsibility for what we do, or may function as criteria for what we are doing that allow us to adjust our action as it unfolds.

Conscious Monitoring Consciousness can occur during behavior, and though it can certainly be directed elsewhere at the time (witness the often-unconscious behaviors of yawning or scratching), it may often be directed toward the behavior continuously or occasionally as it unfolds. What role does such conscious monitoring play in the control process? As a rule, consciousness is attracted to action primarily when the action is faulty. This can happen in two ways. When action is strongly expected to be faulty or error-prone, we may direct conscious attention to it all along. Such premeditated monitoring does not accompany all action, but it does seem to happen regularly when we are especially concerned about our ability to control a particular action. The second kind of conscious monitoring occurs when consciousness is drawn to action by the occurrence of unexpected turns or errors in the action. We can refer to these different conscious monitoring processes as *deliberate monitoring* and *event-driven monitoring.*

Deliberate monitoring plays an important part in the construction of difficult action sequences. The beginning pianist, for example, will struggle through almost every new piece deliberately monitoring the action at many levels ("Did I play an *F*? Why does it sound wrong? Is it supposed to be a sharp?"). Such chronic consciousness of action, although one of the most painful and anxiety-producing aspects of being inexpert at an action (Baumeister, 1984; Kirschenbaum & Tomarken, 1982; Wine, 1971), seems necessary for piecing together the elements of complex action sequences. Consciousness of what is or is not being done allows verbal and other symbolic systems (e.g., musical notes) to set control criteria for parts of complex action sequences that may not even be considered when the person begins the action as a whole (Bargh & Barndollar, 1996; Norman & Shallice, 1986; Sudnow, 1978; Vallacher & Kaufman, 1996; Vallacher & Wegner, 1985).

Event-driven monitoring, on the other hand, seems to happen when actions that are expected to go well instead somehow get off track. The act of driving a car down the street, for example, can suddenly become conscious when the tire strays over the yellow line, when the steering wheel jiggles unexpectedly, or when any of a variety of other potential discrepancies occur. Because consciousness is not focused on the action until the error happens, it must be the case that there are unconscious error-monitoring processes that can thrust their findings into consciousness. Wegner (1994) has suggested that every consciously planned control process invokes such an unconscious error-monitoring process, and that such error monitors function to alert consciousness to the failure of control and reinstate the conscious planning (or re-planning) of action. From this perspective, the incidental conscious monitoring of action, like conscious intention more generally, is itself produced by unconscious processes.

The consequence of this error-monitoring system is usually, then, that errors of control are noticed and attempts are made to repair them by instituting new control criteria. The person who fails to keep the car in the proper lane notices this and consciously plans to steer back into position. According to the theory of ironic processes of mental control (Wegner, 1994), however, the unconscious error-monitoring process has its own influence on mind and behavior that can act ironically to produce the very errors that are being monitored. Someone who consciously plans to keep the car in the lane, for example, institutes at the same time an ironic monitoring process that searches for lane-violating behaviors and may even subtly produce them.

Examples of the operation of ironic monitoring processes usually crop up when the person's conscious control processes are overwhelmed by distractions or stress. So, for example, people who are trying to suppress a thought may have difficulty generally (Wegner, Schneider, Carter, & White, 1987; Wegner, Shortt, Blake, & Page, 1990), but while they hold a number in mind at the same time, they find that the thought becomes even more likely to intrude (Wegner & Erber, 1992). People who are trying to be happy find that under cognitive load, their efforts make them sad—while those who are trying to be sad find that such loads make them happy (Wegner, Erber, & Zanakos, 1993). Similar ironic effects have been found in the control of relaxation (Wegner, Broome, & Blumberg, 1997), sleep (Ansfield, Wegner, & Bowser, 1996), and simple movement (Wegner, Ansfield, & Pilloff, 1996), as well as in the control of the expression of sexist thoughts (Wegner, Erber, Bowman, & Shelton, 1996). People under cognitive load who try to do these things may find themselves—respectively—agitated, awake, moving, or saying just the sexist things they were hoping to avoid (Wegner, 1994, 1996). It seems that imposing conscious control and not allowing it the luxury of plenty of mental work space is a fine way to prompt ironic errors.

In short, although conscious monitoring is helpful in the processes whereby action is corrected as it is ongoing, it seems that monitoring also produces its own family of problems. Deliberate monitoring yields control-repair processes but also prompts obsessive and anxiety-producing overconsciousness of potential errors. Event-driven monitoring, in turn, is involved in most fix-ups of faulty action, but also may produce many instances of counter-control—actions precisely in opposition to what was planned. Although monitoring is an essential element of control that distinguishes it from automatic processes, it is not without its disadvantages.

The Sense of Control

People may sense that they control something when they do not. A disconcerting example of this occurred to one of the authors, for instance, when he was intently operating the controls of a video game for some time, only to find the words "Insert Coin" appearing on the screen—to indicate that the game action was being demonstrated by the machine without any influence from him at all. People may also sense that they do not control something when they actually do. The seemingly magical movement of a Ouija Board pointer is an example of this. Although the sense of control does seem to coincide rather well with actual control in many instances, there are enough divergences to remind us that they are clearly different phenomena (Alloy & Tabachnik, 1984; Ansfield & Wegner, 1996; Langer, 1975).

The sense of control has been far more widely studied and celebrated in social psychology than has actual control. Without much concern about whether the sense of control corresponds with actual control or not, theorists and researchers have examined variations in the sense of control all by itself—usually with the hypothesis in mind that a sense of control is always good. It is difficult to tell exactly where this hypothesis began—as it seems in some ways to resemble the idea (also so popular as to be untraceable) that high self-esteem is a uniformly desirable state (Baumeister, Smart, & Boden, 1996)—and it may be more a North American cultural world view than a derivation from a specific theory. The rise of the idea in modern psychology, however, is often ascribed to White's (1959) theory of effectance motivation.

White held that organisms have an innate desire to have an effect on their environments and gave examples indicating that this desire surfaces in lots of seemingly capricious little expressions of control. Mice who are given a button to push that changes the illumination in their cages, for instance, soon arrive at a preferred level and return the lights to that level if humans attempt to adjust it. The reactions of these testy mice represent, for White, expressions of a general motive for effectance that drives the behavior of all organisms. This need for mastery and autonomy is satisfied not only by actual control over the environment, but also by circumstances that produce illusions of such control.

The largest share of the theory and research on the sense of control has focused on the analysis of individual differences in perceived control, although there has also been interest in situational variations (see Baumeister, 1998, in this *Handbook*; Pittman, 1998, in this *Handbook*). The number of theoretical constructs proposed in the last 30 years either to represent perceived control generally or to express various facets of the idea is truly staggering. An incomplete list would include locus of control (Rotter, 1966; Weiner, 1974), self-efficacy (Bandura, 1977), and intrinsic motivation (Deci, 1975), to be sure, and then embrace constructs including personal causation (DeCharms, 1968), perceived control (Glass & Singer, 1972), attributional style (Peterson, Maier, & Seligman, 1993), illusion of control (Langer, 1975), personal control (Folkman, 1984), optimism (Scheier & Carver, 1985), psychological reactance (Brehm, 1966), personal agency (Vallacher & Wegner, 1989), positive illusions (Taylor & Brown, 1988), and control motivation (Weary, Gleicher, & Marsh, 1993)—to name a few (see reviews by Haidt & Rodin, 1995; Skinner, 1995).

The indications in this voluminous literature that it is psychologically beneficial to perceive control are simply overwhelming. And indeed, this is an important message that has come to be useful in attempts to increase the effectiveness of therapies and interventions of many kinds (e.g., Baltes & Baltes, 1986; S. S. Brehm, 1976). It has come to the point, though, that further demonstrations of perceived control effects are becoming increasingly uninformative. Far too many renamings of the dimension have come and gone, and analyses of the limitations of this broad effect are themselves beginning to gather interest (Colvin & Block, 1994; Burger, 1989; Taylor & Brown, 1994; Thompson, Cheek, & Graham, 1988). Although it is useful to pursue the benefits of perceived control for those individuals to whom real control is by fate impossible, the analysis of perceived control must eventually be integrated with the study of processes of real control if significant scientific progress is to be made.

For our purposes, this literature serves as an important reminder that control must be understood not only as a psychological process but as a *feeling*, an experience one has of controlling or being in control. Control requires effort, and this effort as it is expended yields a continuous sense that one is doing something, not just allowing something to happen. Both the actual expenditure of cognitive effort, and the phenomenal experience of effortfulness, appear to be at a maximum during conscious control.

Summary of Control

This review of the nature of control in social psychology suggests that the concept has both a larger and a smaller meaning. Control in the larger sense is a multifarious psychological process that operates according to control theory. In this sense, "control" incorporates a wide array of the mechanisms and features that seem necessary in the psychological engine that runs a human being. Such control is not opposed to automatic processes and instead can be said to include them as an important special case. But control also has a more limited meaning, one that becomes particularly evident when we consider it in comparison to automaticity. The more limited definition of control includes key properties such as consciousness, and the "closed loop" ability to monitor our behavior so as to vary it flexibly in response to feedback. We turn now to focus

on automaticity, so to put the broad theory of control into this important perspective.

THE NATURE OF AUTOMATICITY

People have always understood that there are functions of their bodies that they can't control, even if they want to. The beating of the heart, workings of the intestines, functioning of the internal organs, and breathing all go on whether we want them to or not. If we try to exert control, such as by holding our breath, the bodily function eventually wins out over our attempt, even if it has to knock us unconscious to do so. Hartley's (1749) early mention of the term "automatic," for instance, was in reference to bodily functions, and not anything psychological such as perception, reasoning, or behavior. Only with the birth of psychology as a science—that is, only for the past 100 years of intellectual history—has the mind been considered and analyzed as an internal bodily organ, instead of a soul or spiritual essence. Along with this demotion of the mind to the physical realm came, among other things, the possibility that the mind, like other bodily organs, could also have some of its operations occurring outside of the individual's control (see Carpenter, 1874; Jastrow, 1906).

Historical Overview

In this section, we trace the concept of automaticity through the history of psychology, beginning with its dual origins in William James's notion of habit and Freud's concept of hidden, motivated influences on thought. From these two sources developed separate research traditions: *skill acquisition* on the one hand, and *preconscious processing* on the other (i.e., the "New Look"; Bruner, 1957). Although these domains of research have very different historical roots, both are considered today as focusing on the *automaticity* of mental life, because they are both concerned with forms of thought that differ in important ways from conscious control—ones that can operate and run to completion without conscious guidance, just like breathing.

Skill Acquisition Automatic cognitive processes are mental habits. Although William James (1890) did not have much truck with the nonconscious, considering this theoretical concept to be "a tumbling ground for whimsies" (p. 163), he nonetheless believed in the importance of habit in daily life. James advised young people to develop good habits of social and ethical behavior, and a disciplined attitude toward their work life as well, so that these could be carried on throughout life rather effortlessly and without much thought. These habits were to be ingrained by consistent and diligent practice on a daily basis. Bad habits, he noted, were very hard to break, and to do so required the utmost vigilance against the unwanted behavior, and no lapses or backsliding.

So while James (1890) expressed skepticism about the importance of nonconscious thought processes, he also held to a model of automaticity very similar to that of present-day psychology: one in which activities frequently and consistently engaged in require less and less conscious effort over time. These patterns become the deep grooves into which behavior falls when not consciously attended, as in James' famous example of the husband being sent up to dress for dinner by his wife because of unexpected dinner guests. With his mind on the tribulations of his day at work, the husband fails consciously to monitor what he is doing and is found upon the arrival of the guests to be in his nightclothes and asleep in bed.

In this example, James anticipated contemporary models of the interaction of conscious and automatic mental processes, in which the role of conscious or effortful processes is to support strategic deviations from the routine, for which there are no preestablished pathways (e.g., Posner & Snyder, 1975). When conscious effort is not forthcoming to support the temporary thought or behavior strategy, the only recourse is the well-worn grooves usually followed in that situation (resulting in absent-minded action slips; Norman, 1981; Reason, 1979).

Whereas James shied away from the idea of nonconscious cognition, Jastrow (1906) explicitly applied the concept of habit to mental life. He proposed a *subconscious* stratum of thought. Routine, unchanging modes of perception and reasoning were held to recede from awareness, and to operate outside of consciousness. In this way the subconscious consisted of the residue of extensive, routine conscious activities, as opposed to a distinct, unconscious mental organ. Jastrow (1906, p. 11) contended that people were designed to be aware of only what they need to be aware of, and not to be aware of those workings of the body—such as the liver or intestine—about which they can do nothing anyway. He called this the "principle of utility" and related it to the operation of the mind as well as the body:

> The principle involved is easily formulated. At the outset each step of the performance is separately and distinctly the object of attention and effort; and as practice proceeds and expertness is gained . . . the separate portions thereof become fused into larger units, which in turn make a constantly diminishing demand upon consciousness (p. 42).

Another important point drawn by Jastrow (1906, p. 45) was the linkage between awareness and intentionality. When habitual thought and behavior patterns eventually drop out of conscious awareness and become subconscious, they also can become subvoluntary. Jastrow thus recognized both the awareness and the intentionality qualities of consciousness.

During the rest of the twentieth century, skill acquisition research (see J. R. Anderson, 1982; Newell & Rosenbloom, 1981; Shiffrin & Schneider, 1977; Smith, 1984, 1998, in this *Handbook*) proceeded to deal with the development of mental expertise or "procedural knowledge," and particularly with the ability of some cognitive processes to operate with a minimum of conscious attention. This is the form of automaticity that Bryan and Harter (1899) and Jastrow (1906) had discussed as mental habits, the delegation to the subconscious over time of routine conscious tasks. In line with Anderson's (1982) more recent notion of compilation of mental skills, Bryan and Harter (1899) held that expertise consists of the automatization of units successively higher in a hierarchy of habits—a buildup of ever larger units or "chunks" of knowledge that operate autonomously once activated (see also Hayes-Roth, 1977; Simon, 1974; Vallacher & Wegner, 1987). For present purposes, a critical guiding assumption of skill acquisition research has been that these processes were put into motion by an act of conscious will. That is, driving and typing and searching for a target in a rapidly changing display were described as becoming automatic after practice, but in all cases the individual knowingly and intentionally engaged in the activity.

Research on attentional information processing soon showed it to be relatively time-consuming in completing its assigned task, limited in scope at any given moment, and serial in nature (Miller, 1956; Sternberg, 1966). Because of these limitations, it became clear to attention researchers "that normal human behavior could not take place if all activity had to be governed by attentive processes operating in such a limited fashion" (Shiffrin, 1988, p. 740). There had to be a different, nonattentional, very fast form of processing operating as well.

This logical analysis led to research by Shiffrin and Schneider (1977) and others designed to search for and demonstrate the existence of this other, *automatic* form of information processing. In the Shiffrin and Schneider (1977) studies, participants were given considerable practice in searching for a target stimulus among an array of other, distracter stimuli. Whereas the time participants took to find a target stimulus in a rapidly changing display began as a function of how many distracters were presented along with the target (i.e., set-size), over many trials this set-size variable ceased to matter: participants were just as fast to find the target in a display of sixteen stimuli as in a display of four or nine. This kind of attentional search therefore had to be parallel in nature, able to scan many targets simultaneously, otherwise the time taken to find the target would be an increasing function of the number of stimuli to scan.

Preconscious Processing A second tradition of research bears on our contemporary understanding of automaticity. Unlike research on skill acquisition, however, this line of research did not assume that the individual's consent or even knowledge of the process was a necessary condition for the obtained effects. Instead, it focused on the initial perceptual analysis of the environment that occurred prior to conscious awareness and participation in the processing—that is, *preconscious* information processing. This research was inspired by Freudian thinking but was not guided much by psychoanalytic theory per se.

The "New Look" in perception (see reviews in Allport, 1955; Bruner, 1957; Dixon, 1981; Erdelyi, 1974) was the seminal line of this research, as it focused on motivational and personality determinants of conscious perceptual thresholds. (For early theoretical arguments in support of preconscious influences on perception, also see Helmholtz [1867/1968].) The notion of *perceptual defense*—in which thresholds are higher for emotionally threatening stimuli—was controversial at the time because it required perceptual analysis to occur prior to the percept reaching conscious awareness. This violated the then firmly held assumption that conscious perception was entirely determined by qualities of the stimulus (see Stevens, 1951) and so emotional and other experiential reactions to the stimulus had to be both in conscious awareness and post-perceptual. There was great resistance as a result to the idea of preconscious perceptual analysis, and so the New Look research findings were largely discredited and treated with skepticism (Erdelyi, 1974). The rehabilitation of the New Look ideas took place only after advances in cognitive theory and research had diminished the importance of consciousness in perceptual analysis (Neisser, 1967; Shiffrin, 1988).

A major reason for the reduced importance given to conscious, intentional processes in perceptual interpretation was a separate research thread on selective attention, which grew out of Broadbent's (1958) work. Broadbent's theory was that selective attention is driven by an early internal gating of incoming information, based on its physical features. Sources of information to which attention is not directed are simply not picked up. Quickly, however, it became apparent that some information did get through this attentional barrier, being processed despite the fact that conscious attention is directed elsewhere. Treisman (1960) found that narration presented to the unattended ear in a dichotic listening task sometimes drew attention if it was related to the meaning of the content presented to the attended ear (although this effect occurred relatively infrequently). This could only occur if the material presented to the unattended ear was analyzed for meaning at least to some extent.

Following Treisman's (1960) finding, there was considerable debate between so-called early-selection and late-selection theorists. Broadbent and Treisman were among those who believed there is only a limited amount of nonattentional analysis of informational input for meaning;

Neisser (1967) made this position the mainstream within cognitive psychology. Others, such as Deutsch and Deutsch (1963; also Erdelyi, 1974; Marcel, 1983) posited a full and complete preconscious analysis of all sensed information for meaning and importance, with entry into consciousness determined by the relevance of the activated meanings for the goals of the individual.

Although theorists today continue to stake out different positions as to the extent of preconscious analysis for meaning, the dominant contemporary view continues to be that expressed by Neisser (1967) and Normal (1968). Building on research in the Gestalt tradition on the development of percepts, which traced the stages of perception from sensation to pattern recognition to figural synthesis of the final, consciously perceived object (Flavell & Draguns, 1957; Werner, 1956), Neisser (1967) persuasively argued that all perception had to involve a process of construction. The final percept that feels phenomenally immediate to us—the house or tree or person—is actually the result of considerable precognitive processing. However, the extent of this preconscious analysis, according to Norman (1968), was not the same for every stimulus event. His model of selective attention emphasized the match between the strength or diagnosticity of external information and the readiness or accessibility of memory representations relevant to that information. These sources of activation jointly determined which external information entered conscious awareness and attention.

But this is only what the New Look theorists had been arguing during the previous quarter century. Norman's (1968) interactive model echoed Postman's (1951; and later, Bruner's, 1957) view of perception as a hypothesis-testing activity, with the outcome of perception being a joint function of the diagnosticity or degree of match between stimulus features and an internal representation of that stimulus event on the one hand, and the internal readiness or accessibility of those internal representations on the other. The readiness to perceive related to the individual's preconceptions or expectations about what was going to happen, as well as internal goals and need states (i.e., what the individual is looking for in the environment).

Thus, in the long run, the essence of the New Look argument about perception won the day. Perception is now widely understood to be an interactive function of internal states—including motivations, values, physiological and emotional state, expectations, and relevant knowledge—and the information available in the environment.

Summary Two basic forms of automatic processes have been studied in psychological research. One concerns the initial perceptual analysis and attentional screening of the environment, prior to and in the absence of conscious involvement. The other concerns efficient attentional and behavioral skills that are started in motion consciously and attentionally. Note that although these have been distinct research traditions, they have always shared a concern with dimensions or qualities that differentiate mental processes. The New Look and selective attention research threads have identified unintentional influences on perception that occur outside of awareness, in contrast to conscious processes that are intended and in awareness. The skill acquisition thread has identified efficient processes that run in parallel once instigated by an act of will (i.e., intention), in contrast to attention-demanding and serial conscious processes.

These research traditions agree as to the nature of the *conscious* processing to which they contrast with their form of automatic processing. There has always been a degree of consensus that conscious processes are those of which the individual is aware, are demanding of limited attentional resources, are intentional, and are serial in that they focus on one object or concept at a time. It was with this consensual view of conscious processes—but with no complementary consensus as to the nature of nonconscious or automatic processes—that contemporary dual-process models of cognition began. The lack of consensus as to the qualities of the nonconscious process—because two different varieties had been studied—was to create some conceptual and interpretational confusion in subsequent years.

Contemporary Views

Psychologists were forced early on to concede that it was impossible for such a slow and resource-consuming form of processing as consciousness to take care of all mental business (Shiffrin, 1988). When contemporary research on automatic processing began, therefore, automaticity was defined as having all the opposite qualities of conscious processing (Posner & Snyder, 1975; Shiffrin & Schneider, 1977); thus, automatic processes were said to be those that were *unintentional*, occurred *outside of awareness*, *efficient* in that they consumed little if any attentional capacity (enabling them to operate in *parallel* with other processes), and *uncontrollable* (not able to be stopped once started). Hence, early cognitive models of conscious versus automatic processes proposed a dichotomy: a process was either conscious and controlled or it was automatic, with all the defining features of one type but none of the other.

The Posner-Snyder Model Because automatic processes operated concurrently with conscious processes, an important question was how the two forms of processing interacted, especially when their outcomes were contradictory. Posner and Snyder (1975) addressed the interaction of these two forms of processing. In their model, automatic processes at encoding were triggered directly by the presence of the relevant stimulus—that is, without conscious intention—and did not consume attentional resources.

These processes also occurred quickly, within 200 or 300 milliseconds. (Because they were concerned with processes occurring at the time of the original perceptual encoding of the stimulus, the Posner-Snyder theory and research was in the tradition of the New Look and other studies of preconscious perceptual analysis.)

Conscious processes take longer to develop—at least 500 or 600 milliseconds—and require considerable attentional resources, but they are flexible and can be suited to meet strategic processing goals. As for the interaction of these two processes, Posner and Snyder (1975) held that if given enough time to develop, strategic conscious processes can override automatic ones if the responses suggested by the two are incompatible, but if there is insufficient time or attentional resources to support the conscious process the automatic one would prevail.

Empirical support for this model was quick to come. Neely (1977), using a lexical decision task, had participants indicate as quickly as possible whether each of a series of target stimuli was a word or nonword. Prior to the presentation of each target a prime word was presented. Target words were members of the category BODY (i.e., parts of the body such as *heart* or *leg*) or the category FURNITURE (e.g., *chair, table*). The prime stimulus was either the word BODY or the word FURNITURE. A key element of Neely's (1977) design was to vary the delay between prime and target presentation. With brief delays (e.g., 250 milliseconds), only automatic effects should be able to occur; thus, the prime BODY should facilitate (speed up) responses to names of parts of the body (and likewise for FURNITURE and names of pieces of furniture) because strong, automatic connections are assumed to exist between these target concepts and their higher-order category concept. Only with longer delays (e.g., 750 milliseconds) should strategic conscious expectations be able to influence responses.

In the critical experimental condition, participants had a conscious expectancy for the *opposite* of the semantically consistent prime-target combination. In other words, they expected the BODY prime to be followed by names of pieces of furniture and for FURNITURE to be followed by names of body parts. However, the automatic effect would remain the same as always, as it reflects long-term associations and cannot flexibly adapt to temporarily altered circumstances. In support of the Posner-Snyder model, Neely (1977) found that under these conditions, category-name primes continued to facilitate responses to members of that category under the short prime-target delay conditions—even though the usual pairing in the experiment was for the prime to be followed by members of the other category. And under the longer prime-target delay, category-name primes facilitated responses to members of the alternative category, despite the automatic activation of same-category members.

This research confirmed several important features of automatic processing and its interaction with conscious processing. First, automatic processes are a mapping of the long-term regularities of the environment and do not change or adapt to short-term fluctuations in those regularities. Conscious control processes, on the other hand, are flexible and can be tuned to map the local circumstances when they differ from the usual. Second, when automatic and conscious control processes suggest competing responses, the conscious process dominates the automatic. This would seem quite a functional arrangement in that it allows adaptation to those times when "what one knows is wrong." Indeed, for it to be the other way around and have the automatic process dominate would make the flexible conscious or strategic processing entirely superfluous. Implicit in this second point is that the interaction of the two modes of processing nonetheless produces a single response instead of an attempt to make both (or many, given the parallel nature of automatic processing). For the conscious process to "win out" over the automatic response in the critical opposed-responses condition of the Neely (1977) study, it must inhibit the automatic response.

This points to a third difference between automatic and conscious processes—the controlling or inhibitory nature of conscious processes and the inhibitionless nature of automaticity (see also Shallice, 1972). Although such inhibition does not come without a cost of attentional effort and thus time (resulting in longer response times, as in the Stroop color-word effect; see Logan, 1980), it nonetheless enables a single, nonhabitual response to the environment.

Fourth, and finally, automatic processes—at least during perceptual encoding—do not require the person's intention that they occur and in fact are not controllable; clearly in the Neely (1977) study the participants were trying to control the automatic response when it was known to be incorrect, as they did so when they had enough time to accrue the attentional resources to do so (i.e., in the long prime-target delay condition).

The Shiffrin-Schneider Research Whereas the Posner-Snyder theory and related research were in the tradition of preconscious automaticity research, Shiffrin and Schneider's (1977) research grew out of the skill acquisition tradition. Shiffrin and Schneider (1977) demonstrated the development of automatic attention responses to target stimuli over time, with such attentional skills depending on frequent and consistent mapping of a given target or set of targets to the detection goal. In other words, if a given stimulus (e.g., the letter "G") was the target to be detected on some trials (by pressing a button as quickly as possible after it was presented) within a display of items (the others being distracters), but was on other trials a distractor item (with some other letter as the target), automatic detection capabilities did not develop. When a given stimulus was

consistently the target across trials, the participant became able to detect it more and more quickly in the display, moving from a process in which each item in the display had to be searched serially (so that response times were an increasing linear function of the number of items in the display) to a process in which the display could be searched in parallel (with response times not a function of the size of the search-set).

The qualities of automatic processes evidenced by Shiffrin and Schneider's (1977) results were as follows. Automatic processes develop out of frequent and consistent experience with the environment; they operate in parallel and are very efficient in their use of attentional resources. As the participant's goal was to find the assigned target on each experimental trial, these automatic attention processes were intentionally put into motion—just as the attentional and motor skills involved in driving or typing require the intention to drive or type (see Logan & Cowan, 1984). But given the overarching intention to find a consistently mapped target in the Shiffrin-Schneider paradigm, the process required no further conscious guidance; the act of intention or will effectively delegated the task to subconscious processes (see Jastrow, 1906, pp. 16–17).

Summary of Automaticity

What is the essence of automaticity that emerges from these historical and modern considerations? In all cases, the process is autonomous in that, once started, it runs by itself and does not need conscious guidance or monitoring. In all cases, the process is very fast and efficient in that it uses only minimal attentional capacity. It also appears that all automatic processes—both in perceptual categorization and in skill acquisition—develop out of frequent and consistent experience in an environmental domain. (However, affective influences in perception as studied by the New Look investigators as well as contemporary researchers may be an exception to this general principle.)

The major difference between the two forms of automaticity lies in the conditions needed to start them in motion. Long ago, Jastrow (1906, p. 45) had differentiated these two varieties, noting that some subconscious processes "require merely the initial start," whereas others require even less, just "the familiar succession of slight stimuli, to run themselves off the reel." Thus some automatic processes are goal-dependent while others are goal-independent, being driven by the stimulus environment itself, prior to any conscious involvement in their processing (see Bargh, 1989).

Automatic processes grow out of one's frequent and consistent experience, so that they represent the regularities of that experience. Routine conscious processes, whether they are concerned with perceptual or behavioral responses to the environment, become subsumed by efficient automatic processes that operate without the need for conscious guidance, attention, or awareness. Automatic processes vary as to the conditions needed to set them into operation; some require just the mere presence of the relevant stimuli in the environment (as in the activation of perceptual categories) while others require an act of conscious will (as in the engagement of well-practiced attentional or motor skills).

RELATIONSHIPS BETWEEN CONTROL AND AUTOMATICITY

We have discussed the concepts of control and automaticity largely in isolation to this point because the literatures surrounding these concepts, despite their obvious definitional interdependence, have grown up quite independently. Consequently, sensible stories about them can be told with little reference to each other. Now, however, it is time to take explicit stock of the relationships between control and automatic processes. We begin with a brief overview of the distinction between these processes to review the discussion so far, and then we posit seven distinct relationships between control and automatic processes that seem to capture much of what is known about how the two kinds of processes interact.

Control and Automaticity Compared

The definitions of control and automaticity do not stand on equal footing. Although there seems to be substantial intuitive and theoretical agreement as to the defining qualities of a conscious control process, the nature of automaticity has been a matter of frequent discussion and refinement. As detailed in the previous section, for some time it seemed perfectly reasonable to define an automatic process simply as having qualities polar opposite to those of conscious control (Posner & Snyder, 1975), but this approach has proven problematic. Unlike the properties of conscious control, those of automatic processes do not hang together in an all-or-none fashion (Bargh 1984, 1989; Neumann, 1984; Shiffrin, 1988).

There are several features which must be jointly present in a psychological process for it to count as an instance of conscious control. As we have seen, conscious control occurs with a conscious intention of what the control will accomplish, a sense or feeling of control, an expenditure of effort in the control action, and a (closed-loop) monitoring of the control output. Automatic processes do not necessarily lack *all* these features, and in this sense they are not complete polar opposites of conscious control. Rather, automaticity is used to refer to a family of processes which share only the lack of some one or a subset of these features. Automaticity, then, is a negatively defined concept—an absence of at least one key quality of conscious control.

This means that automatic processes often seem very much like conscious control processes and function in many of the same circumstances. The process that determines whether we say "hello" to someone we pass on the street can vary in seemingly minor ways, and move dramatically as a result from a conscious control process to automatic or back the other way. Automatic and conscious control processes have many of the same kinds of behavioral consequences and may respond to many of the same kinds of environmental inputs. In essence, although they may differ at a fundamental level, they both fall broadly under the rubric of psychological control processes. With this in mind, we can now consider the relationships that exist between control and automatic processes.

Control and Automaticity Together: Their Basic Relations

The complicated interplay of control and automatic processes in everyday life can be parsed into a relatively small set of basic relations. In what follows, we enumerate these with a view toward capturing what we see to be the fundamental ways in which these processes combine and interact in psychological functioning.

1. Multitasking: Control and Automatic Processes Can Run in Parallel The flow of thought and behavior pieces together an array of processes. At any one time, one process is probably consciously controlled (Shallice, 1972). A very limited number of others can be consciously controlled if they can claim enough attention (Neisser, 1976). By and large, however, because of their lower attentional requirements, automatic processes can run in parallel, not only with control processes but also with each other (Bargh, 1997). It is not clear what limits there might be to the number of parallel automatic processes (Shiffrin, 1988).

In a social interaction, for example, we may well respond rather automatically or "mindlessly" (Langer, 1978, 1989) to the conversation of one person that has long since ceased to interest us, but at the same time effortfully plan a witty remark in order to impress another person standing nearby. Are we interacting automatically here, or consciously? If we think of the entire interaction as a single process no clear answer can be given to that question, but if we analyze the interaction into its components, then the matter is much clearer. Both automatic and control processes are operating; even when we are "on automatic" about one aspect of our environment, the conscious attentional capacity that is freed up is able to be deployed in the pursuit of other important goals we have. Ultimately, both kinds of processes are responsible for the successful negotiation of the social world.

2. Delegation: A Control Process Can Launch an Automatic Process In social psychology many studies have shown that dispositional attribution, social judgment, and stereotyping processes are so efficient as to be capable of operating in the absence of conscious attention. Yet in all these studies, participants were explicitly instructed to engage in social perception or judgment tasks (see Bargh, 1989, 1994, for reviews). Thus the processing was under intentional control, while at the same time being very efficient and autonomous. These are examples of automatic processes that are instigated by a control process.

3. Orienting: An Automatic Process Can Launch a Control Process Orienting happens when a distinctive, salient event automatically attracts our attention and control processing. Something out of the ordinary happens, a friend does something totally out of character, or we see something really unusual—and control processes are instigated in order to understand and fit this new piece of information into what we already think we know. The literature discussed in this chapter on attention effects documents this case of orienting, when control processes are automatically triggered by environmental events or stimuli.

4. Intrusion: An Automatic Process Can Override a Control Process Automatic processes have been held suspect as the causes of errors that get in the way of consciously controlled behavior for many years, certainly since Freud (but see Bargh, 1997; Bargh & Barndollar, 1996). Research on ironic processes of mental control (Wegner, 1994) illustrates a variety of cases in which counterintentional automatic processes are produced that inhibit conscious control, not just randomly but as a direct result of their inherence in conscious control. When we try to suppress a thought while we are under mental load and find it coming back more often, we suffer from an automatic process that intrudes upon and inhibits conscious control.

5. Regulation: A Control Process Can Override an Automatic Process When control processes have access to enough attentional capacity, they can inhibit automatic processes (Bargh, 1989). As Devine (1989) has pointed out, for example, stereotyping consists of the automatic activation of the stereotypic representation of the social group, and the use of the information stored within that representation in making judgments about an individual. Her research showed the first, activation component process to be uncontrollable given stimuli related to the stereotyped group (African Americans) but the second, application component process to be controllable for individuals motivated to engage in that act of control. Control processes are commonly marshaled in service of just such inhibition (see also Fiske, 1989).

6. Automatization: A Control Process Can Be Transformed into an Automatic Process When a control process is repeated often enough, it can become automatic (e.g., Bargh, 1984; Jastrow, 1906; Shiffrin & Schneider, 1977). This may entail reduced monitoring, increased efficiency, reduced flexibility, losses in the sense of control, and a variety of other consequences. Although this observation may seem too obvious to mention, it is worth noting that this principle suggests there is a constant flux in the status of the conscious control of any given process throughout daily life (Vallacher & Wegner, 1985, 1987). Processes called upon to deal with new environmental stimuli may be consciously controlled at first, only to recede from conscious control in one or another way as habits grow.

7. Disruption: An Automatic Process Can Be Transformed into a Control Process Given the often only slight difference between automaticity and control, it may take no more than a bit of conscious reminding about a process before it occurs, for example, or a touch of monitoring of it afterwards, to turn it from automatic into consciously controlled. We all have had the experience of finding our conscious attention drawn to a previously automatic act, for instance, when the act occurs ineffectively or conspicuously. Although this is commonly understood as a disruptive event (Baumeister, 1984; Wegner, 1994), it is also the source of renewed flexibility and potential adaptation of the action (Vallacher & Wegner, 1985, 1987).

These seven basic relations between control and automatic processes are useful in describing and accounting for the operation of mind across a wide range of social behavior. In the next section, these terms serve as a shorthand to capture many of the theoretical and research themes of the field.

DOMAINS OF CONTROL AND AUTOMATICITY RESEARCH

There are several areas of social psychological research for which issues of control and automaticity have special relevance. We consider here the topics of attitudes, social cognition, emotion experience, and expressive behavior. These topics all bring issues of control and automaticity to the fore because they share, along with the classic studies in the field, a concern with the genuineness of social behavior. Does the person genuinely hold this attitude, really believe in that stereotype, actually experience a given emotion, or privately experience the state signified by the publicly expressed behavior? When it comes to "crunch time," where do a person's loyalties and inclinations lie? The rule of thumb here has been that if a behavior can be attributed to automatic processes, it is more genuine than one that reflects conscious control. We believe that this is because people recognize that strategic editing of one's opinions and beliefs, and shaping of one's behavior towards what others expect and wish to see, require control and do not happen automatically.

This is not necessarily a safe universal assumption, as there are exceptions—indeed, sometimes the behaviors we perform automatically occur only because we consciously do not want to do them (Wegner, 1994), or because of passive effects of perception on behavior (Bargh, Chen, & Burrows, 1996). As we shall see, though, the issue of genuineness retains its interest value across topics and has given rise to informative scientific literatures addressing the control and automaticity of a range of social behaviors.

Attitudes and Beliefs

Issues of automaticity and control have long been a theme of attitude research, in all areas: the control one has over the formation of one's attitudes in the first place, over changing those attitudes in response to persuasive influences, and in the role those attitudes play in guiding one's behavior toward the objects of the attitudes.

Attitude Formation Attitudes that form just because the person is exposed to the novel attitude object repeatedly over time (Zajonc, 1968) can be considered to have developed automatically. This mere exposure effect appears to be due to a buildup in strength of the representation of the novel object with repeated exposure to it that increases the ease of perceiving the object (Gordon & Holyoak, 1983; see also Jacoby, Kelley, Brown, & Jasechko, 1989). Such perceptual fluency produces a positively valenced feeling of familiarity associated with the attitude object.

Because the individual did not intend to evaluate the object, the increasingly positive attitude that results from repeatedly encountering it did not require any conscious involvement in the process (such as consideration of how the object relates to important self-goals). That the mere exposure effect does not require conscious involvement to occur is indicated by the often replicated finding by Kunst-Wilson and Zajonc (1980) that the effect occurs even with repeated subliminal presentation of novel stimuli (see review by Bornstein, 1989). (In the case of subliminally presented novel stimuli the positive affect due to fluency is misattributed in the test phase to observable qualities of the stimulus, because the participant has no conscious recollection or experience of ever having seen it.) In terms of the seven relations between control and automatic processing, such automatic attitude formation is an instance of *multitasking*, because it occurs while the person is dealing with the attitude object simultaneously with a nonevaluative control process. (Even in the case of subliminal stimulus presentation, the participant has some kind of ongoing control processing task.)

Another automatic source of attitude formation is via

classical conditioning: the association of the novel attitude object with another object or event that already has a positive or negative valence. The original studies that attempted to demonstrate classical conditioning of attitudes (e.g., Staats & Staats, 1958) were open to alternative interpretations, the most problematic being demand effects (see review in Eagly & Chaiken, 1993, pp. 399–412). However, a study by Krosnick, Betz, Jussim, Lynn, and Stephens (1992) used subliminal presentation of the unconditioned stimulus (UCS)—faces with either positive or negative emotional expressions—in order to eliminate such objections. Novel attitude object stimuli were paired with subliminal emotional facial expressions, and subsequently expressed attitudes toward these novel objects were in line with the valence of the UCS (facial expressions) associated with them during the study phase of the experiment. A similar interpretation could be made of the finding by Niedenthal (1990) that subliminally presenting an emotional (human) face just before a target cartoon face affected whether the cartoon character was perceived as being sad or happy. Although Niedenthal (1990) interpreted the effect in terms of affective priming, in light of Krosnick et al.'s (1992) results, it could also be that the valence of the subliminal facial expression conditioned the participants' attitudes toward the cartoon characters.

A form of automatic attitude formation appears in the finding of Cacioppo, Priester, and Berntson (1993) that muscular feedback influences attitude formation. When an individual's arm was flexed (bent with hand near shoulder), he or she tended to form favorable attitudes toward novel stimuli; when the arm was extended straight out, the individual tended to form negative attitudes. Presumably, arm flexion is associated with approach motivations (see Lewin, 1935), in that the arm is in the position of pulling something in toward the body. Arm extension is associated with avoidance motivations, as the arm is pushing away from the body. Because people are motivated to approach those objects that they positively evaluate, and to avoid those they negatively evaluate, the muscular feedback associated with approach and avoidance reactions was apparently associated with the novel stimuli, producing another type of classical conditioning of attitudes. Again, this effect on attitude formation is preconsciously automatic (and a case of *multitasking*) because the participants in the experiment were not aware of any relation between their arm positions and their feelings about the novel attitude objects.

There appear to be immediate, automatic processes operating in belief formation as well as in attitude formation. In an analysis of the dynamics of belief formation, Gilbert (1991, 1993) contrasted the Cartesian model, in which an idea is first represented in the mind and then (consciously and deliberately) assessed for its truth value, with the argument by Spinoza that ideas are by default (i.e., automatically) accepted as true—that is, they are believed—and only then tested for falsity (via a conscious and deliberate process). In terms of the various relations between automatic and control processes, Descartes' position on belief formation is clearly one of control *regulation* of the automatic belief representation, whereas that of Spinoza is one of *multitasking* as automatic belief happens independently of concurrent control processing.

As with Gilbert's (1989; Gilbert & Malone, 1995) related work on default attribution processes, the importance of positing an initial automatic belief stage is that if the second, conscious stage of checking the initial belief for veracity is prevented for some reason—a common one being a momentary lack of attentional resources to support the conscious process—then the idea will be accepted and believed when it otherwise might not have been.

Gilbert, Tafarodi, and Malone (1993) tested the Spinozan against the Cartesian model of belief formation by having participants allegedly learn a new language. They saw statements of the form "An X is a Y" with either the word true or the word false coming on the screen after each statement. On some trials, the task was interrupted prior to the appearance of true or false and participants instead were confronted with a reaction time task. The effect of this manipulation was to prevent the second stage of truth assessment. If ideas were merely represented initially without being automatically accepted as true, then statements presented on these interruption trials should be no more likely to be accepted as true as other statements. However, in line with Spinoza's claims, participants were more likely to misidentify these interruption-trial statements as true when they were in fact false than false items on noninterruption trials. And also consistent with Spinoza's model, the interruption manipulation had no effect on the subsequent correct identification of true statements. In another experiment, Gilbert et al. (1993) showed the real-life importance of automatic initial acceptance of information. In a jury trial simulation, false information about a defendant was nevertheless believed by participants and affected their sentencing decisions if participants' attentional resources were diverted by a secondary task. Without the conscious processing resources to correct or check the veracity of incoming information, then, we tend by default to believe it to be true.

Models of Attitude Change The road to attitude change may sometimes lead through a reasoned, effortful consideration of message content and other features of the communication—or it may happen automatically and without much conscious thought at all. Models of persuasion taking into account such dual processes bear some similarity to the distinction between control and automatic processes but also differ from it in important ways.

One such model is Chaiken's (1980) heuristic-systematic model (HSM), a distinction between *heuristic* and *sys-*

tematic processing of persuasive messages. Systematic processing corresponds to an effortful consideration of the quality of the arguments, including consideration of relevant nonmessage information such as the expertise of the source. Heuristic processing, on the other hand, makes use of simple decision rules (e.g., "length equals strength" of an argument) which enable decisions to be made as to whether to accept or reject the persuasive attempt without effortful consideration and weighing of the arguments themselves.

The heuristic-systematic distinction resembles but is not identical to the automatic-control process dichotomy. Both heuristic and systematic consideration of persuasive messages can involve intentional processing, because to engage in one processing strategy versus the other is a choice made by the individual. The different strategies are really a choice between features of the communication situation to which one will attend, with this choice driven by the importance of the issue for the individual as well as other motivations he or she might currently have. These different possible motivations also affect the *nature* of the processing the information receives. As in models of automatic and conscious processing (e.g., Posner & Snyder, 1975; Logan, 1980), the HSM holds a multitasking assumption, in that the heuristic mode can influence processing even when systematic consideration of the message is underway. Indeed, the outcome of the systematic processing of the message may be influenced by the ongoing heuristic processing of it.

The Elaboration-Likelihood Model (ELM) of persuasive message processing (Petty & Cacioppo, 1984) also distinguishes between two routes to persuasion; a "central" route in which the quality and logic of the arguments themselves are the basis for the attitude change, and a "peripheral" route in which other features of the persuasion situation are the basis. Examples of such message-external features are the expertise or credentials of the source, or the extent to which the source is seen as objective versus having a vested interest in the matter. Factors that move the individual from one route to the other when presented with a persuasive message are the importance and relevance of the issue to the individual's goals and concerns. Thus, the ELM characterizes the interplay between automatic and control processes more in terms of *regulation* than *multitasking*.

When motivation to engage in effortful (systematic or central-route) processing is low, or attentional capacity to be able to engage in it (even when motivated) is in short supply, or both, one would expect a greater reliance on the less effortful modes of processing. It appears to be a general rule throughout attitude and social cognition research that conscious, deliberate forms of processing information about attitude issues as well as about people are not used unless the individual has both the attention and the intention to give the matter full consideration (Bargh, 1989; Bargh & Thein, 1985); in their stead, stereotypic and heuristic shortcuts are taken.

Both the HSM and ELM dual-process models bear some similarity to the automatic-control process distinction, in terms of the differential amounts of effort needed to reach an attitude position required by the two processes. However, within both models, even the less effortful mode of message processing is to some extent intentional and strategic on the part of the individual. Moreover, in neither model do the respective theorists contend that the heuristic or the peripheral route processing is autonomous once instigated, not requiring any conscious guidance.

Automatic Attitude Activation A more direct application to attitude research of the Posner and Snyder (1975) model of automatic and control processing was made by Fazio (1986, 1990), specifically apropos of the attitude-behavior relation. To the extent one's attitude toward a person, event, or object becomes active only when one consciously retrieves it, the attitude might not play any role in behavior toward the attitude object if such conscious retrieval is prevented. If the person is paying attention to other things at the time, for example, he or she might not stop to think about feelings toward the object before dealing with it. But attitudes that become active *automatically* upon the presence of the attitude object, on the other hand, would not be so restricted by the current demands on control processing, and would thus be able to exert a more consistent influence on behavior across situations.

Therefore, Fazio, Chen, McDonel, and Sherman (1982) proposed a model of *attitude accessibility*. This model, which combined Fiske's (1982) notion of *category-based affect* with Higgins and King's (1981) work on the determinants of knowledge accessibility in memory, defined an attitude as an evaluative tag associated with the representation of its corresponding attitude object. The key principle of this model was that the probability of an attitude influencing behavior was a function of its likelihood of becoming active in the mere presence of the attitude object (i.e., without the need of intentional or control processing to active it), and that this likelihood was in turn a function of the strength of the associative connection between the object representation and the attitude.

Early studies of this idea (Fazio et al., 1982) increased the accessibility of attitudes temporarily via a repeated-expression manipulation and found increased accessibility resulting in behavior more consistent with the expressed attitude. But it was important for this model of the attitude-behavior relation to be able to show that preconscious automatic activation of attitudes occurred, and not just post-conscious automatic activation due to recent use and activation. To support the proposed account of why some attitudes but not others consistently affect behaviors, it had

to be shown that the mere presence of the attitude object was all that was needed to activate the associated attitude.

Several tests of this hypothesis were provided by Fazio, Sanbonmatsu, Powell, and Kardes (1986). In a conceptual replication of the Neely (1977) experiment, the names of attitude objects were presented as prime words, followed by a target adjective to which participants responded. In all three experiments, a trial consisted of one attitude object name appearing as a prime, and then an adjective as a target, and participants were to press a button (either one labeled "good" or one labeled "bad") as quickly as they could to report whether the adjective was positive or negative in meaning. On the critical trials, following Neely's (1977) procedure, the delay between prime and target was too brief (ca. 250 milliseconds) for any conscious, strategic processing of the attitude object prime. Thus, if the name of the attitude object automatically activated its associated attitude in memory—with *attitude* defined by Fazio et al. (1986) as the evaluation of the object as good or bad—then participants should be predisposed to make that response (i.e., "good" or "bad") to the target adjective that followed. This would facilitate or speed up responses to adjectives of the same valence as the attitude object prime (i.e., good-good or bad-bad trials), and also cause responses to adjectives of the opposite valence to be slowed down (i.e., good-bad or bad-good trials) because of the need to inhibit the automatically activated incorrect response (see Logan, 1980).

Fazio et al. (1986) predicted such an automatic activation effect only for the participant's strongest attitudes, not for all attitudes. In line with the *automatization* relation between control and automatic processes, Fazio et al. (1986) held that attitudes become automatic through frequent and consistent controlled evaluation of the object. The strength of an attitude was defined operationally in terms of how quickly participants evaluated each of the attitude object stimuli as quickly as they could after its name was presented on the computer screen. The attitude objects corresponding to the four fastest "good" and "bad" responses, and to the four slowest "good" and "bad" responses, were selected to serve as the attitude object primes for the experimental phase of the study.

Results confirmed that the automaticity effect occurred for the participants' strongest but not weakest attitudes; in two experiments, only the names of the participants' "strong" attitude objects facilitated responding to adjective targets of the same valence, compared to when the targets were of the opposite valence. Given the brief time between prime and target (stimulus onset asynchrony, or SOA) on those trials, too short for a conscious expectancy to develop regarding the valence nature of the target word, such an effect could only occur if the strongly held attitudes had become activated automatically. Under conditions in which the SOA was longer (1000 milliseconds), control regulation of the automatic process did occur.

Subsequent research by Bargh, Chaiken, and their colleagues (Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996; Chaiken & Bargh, 1993) centered on two issues. First, given that the effect occurred for the strongest but not the weakest of the participants' attitudes, what about the great majority of the participants' attitudes across the middle of the strength distribution? Was automatic attitude activation a rare or a common event? Second, was the effect truly automatic in that it would occur if—unlike in the original paradigm—participants were not explicitly instructed to evaluate the target words and had not just given their evaluations of the prime words? Did attitudes spring to mind automatically in real world situations, in which one has not recently thought about one's likes and dislikes?

The answer to the first question turned out to be related to the answer to the second question. When these problematic aspects of the Fazio et al. (1986) procedure were removed—when a two-day delay was interposed between the attitude assessment phase and the automaticity task, for instance, and when participants pronounced instead of explicitly evaluated the target stimuli—the effect was obtained for all attitude objects studied, and with no moderation by attitude strength (Bargh et al., 1996; Chaiken and Bargh, 1993). That is, when intentional, control evaluative processing aspects of the paradigm were removed in order to test for their contributing role in producing the effect, not only did the effect continue to occur (strongly demonstrating its automaticity), but it occurred more generally, across a wide range of attitude strengths, and was not moderated by differences in strength.

As it turns out, Kihlstrom (1987) had presaged this exact pattern of results a decade ago. Specifically, he argued that deliberate, control processing of a given stimulus could restrict or interfere with implicit and nonconscious affective reactions to that stimulus. It is important to note that over the same ten-year period, research programs in several other domains have produced the same conclusion. In a meta-analytic review of the mere exposure effect, Bornstein (1989) concluded that subliminal presentations of the novel stimuli produced stronger effects than did supraliminal presentations. Research on the "affective primacy" hypothesis has experimentally demonstrated that subliminal presentation of affect-laden stimuli results in stronger and more pervasive affective priming effects than supraliminal presentation of the same primes (Murphy, Monahan, & Zajonc, 1995; Murphy & Zajonc, 1993). And there are suggestions in the ongoing research on automatic stereotype activation (see below) that passive processing of stereotype-relevant features results in a more pervasive stereotype activation effect than do experimental conditions involving more active, control processing of the stereotypic features (see Bargh, Chen, & Burrows, 1996; Devine, 1989; Fazio, Jackson, Dunton, & Williams, 1995).

It appears, then, that the automatic activation of evalua-

tions or attitudes by the mere presence of the attitude object in the environment is a ubiquitous phenomenon, similar to the activation of semantic meaning by the presence of a word during reading, or to Gilbert's (1993) demonstration of default, preconscious belief processes. Activation of its evaluation by an environmental stimulus thus is a default, preconscious reaction, occurring as part and parcel of the perception of that object. The most important consequence of this is that variations in the automatic attitude activation effect per se cannot explain variations in the attitude-behavior relation, because all attitude objects activate their evaluation upon their mere presence in the environment. That is, the reason why some attitudes affect behavior more consistently than do other attitudes cannot be because the mere presence of some attitude objects in the environment activates the associated attitude, while the mere presence of other objects does not.

The evidence is that it takes more than the mere presence of the attitude object to produce variations in attitude activation according to attitude strength. When a person is currently or has just engaged in conscious evaluative thinking, then and only then does the accessibility of the attitude (technically speaking, the strength of the object-evaluation association in memory; see Fazio, 1986; Fazio et al., 1982) seem to moderate the subsequently observed automatic attitude effect. In other words, the evidence to date suggests that attitude strength does play a moderating role in the activation of the attitude to the extent the object is being given conscious scrutiny (i.e., when it is the current focus of the person's goals); otherwise, any and all attitudes become activated automatically.

In summary, automatic processing is involved in all aspects of attitude functioning, from formation to change processes to the effect of attitude on behavior. The growing body of evidence of automaticity in these areas is conceptually related to the growing evidence of automaticity in affective information processing more generally, especially for models of attitudes that focus particularly on their evaluative dimension.

Social Judgment, Attribution, and Stereotyping

Attaining an understanding of a person is a seriously important activity in social life. Control processes and automatic processes are both involved in this enterprise, but the general trend in this area of research has been to examine the degree to which social cognition proceeds automatically—against the background assumption that the balance of the processes involved include the exercise of conscious control. In what follows, we trace these automatic effects of the social environment as they proceed ever further inside the mind. We start with automatic determinants of perceptual selection and attention to social information—what types of information catch one's eyes and ears with regularity?

Once social information is noticed in the first place, it can of course be processed according to current goals and purposes, but automatic effects can also continue on to reach higher levels of analysis—that is, to the activation of more abstract representations of the information such as concepts, categories, and schemas. However, objects and events in the social environment can be categorized in a great many different ways, and so we review the evidence as to which types of categorizations tend to occur naturally, stimulated by the presence of the relevant information alone. The forms of such automatic categorization that have received the lion's share of research attention have been the categorization of social behaviors in terms of trait concepts, and the pigeonholing of individual members of distinctive social groups in terms of that group's stereotype.

The last steps in social perception involve understanding what people are like and why they do what they do. Do automatic effects of the environment extend so far as to influence the formation of impressions and causal attributions? This has been a central question in social cognition for the past two decades, and we end this section with an answer based on a survey of the relevant evidence.

Initial Screening of the Environment Some forms of information are more likely than others to be selected for attention and consideration out of the great amount of available stimulation, because they automatically grab one's attention. Automatic attention responses take two forms, goal-dependent and preconscious. Goal-dependent automatic attention occurs when, once a goal is in place and operating, objects and events relevant to that goal seem to "pop out" from the background. Preconscious automatic attention occurs when social information attracts our attention regardless of our current goal.

Attention is often if not usually goal-directed. What we look at and the way in which we think about it are mainly determined and regulated by the goal we have at the time. When we walk down a busy street, we see the people, bicycles, cars, and also puddles that we need to avoid in pursuing our goal of safely and dryly navigating to our destination. And we have done this often enough not to have to intend or try to seek out these obstacles so as to avoid them: our currently active goal causes them to jump out at us because they are relevant to that goal (see Bruner, 1957).

But if we see the same people in another context, for example at a restaurant or a classroom, we no longer focus automatically on their speed and trajectories, but on other features, such as whether we know them or not, or if they are wearing something interesting, or if they seem to be enjoying their meal (and if so, what did they order?). So not only *what* we pay attention to but also *which* of its aspects we pay attention is largely determined by our current purposes, and in such a way that we do not need to control the direction of our attention. The important pieces of information related to those goals will jump out at us automatically

(i.e., the *orienting* relation), at least if we have engaged in that goal often enough (such as walking down a street safely). When we are driving a car, for example, the red light or stop sign automatically grabs our attention and we respond accordingly, our foot moving toward the brake pedal without our need to intentionally decide to do so. But if we are just walking down the street, or looking out our office window at it, the red light or stop sign has no such effect (see Bargh, 1992b). The automatic attention response is dependent on which intentional control process is currently operating.

Therefore, as Jones and Thibaut (1958) first noted, the information that is picked up in a social interaction is heavily dependent on the person's current conscious purpose, or operating control processes (see Bargh, 1990; Gollwitzer & Moskowitz, 1996; Read & Miller, 1989; Wyer & Srull, 1989, for reviews). It is very much as if the conscious operating goal *delegates* to automatic processes the job of detecting and alerting the system to the presence of goal-relevant information. These goals are not only the one most frequently studied in social cognition experiments, however—the goal of impression formation. Often if not usually one has other important goals to pursue during the interaction. One's pickup of information when interacting with people is largely determined by their utility for achieving that goal (Wicklund & Steins, 1996) rather than by their personal characteristics. If an individual is trying to ingratiate or impress another person, for example, information concerning whether that person is reacting favorably or not is gobbled up voraciously, whereas one cares much less about such evaluative feedback if the other is a subordinate to whom one is giving instructions (see Fiske, 1993; Kipnis, 1976).

"Most Favored Information" Status: Privileged Access to the Judgment Process In addition to information relevant to our current goals, there are forms that seem to gain access to our minds independently of these goals—and thus serve as a chronic and consistent source of influence on our judgments. There are four such privileged types of information that we should note: information related to the *self;* information that is *frequently experienced;* information about *negatively valued* social behavior; and *social category* information.

Self-relevant information chronically attracts our attention and intrudes on our ongoing control processing, the most famous example being our own name—a phenomenon known as the "cocktail party effect" (Cherry, 1953). We may have no idea what a cluster of people at a party are talking about, engaged as we are in our own conversation with others, but if someone in that other group says our name, suddenly our ears zero in on their conversation. It is as if we have sensitive antennae that pick up self-relevant information even when we are not intending to pick it up; such information is often able to break through the attentional barrier set up by our current goals and purposes.

Other research has shown that we are similarly sensitive to any information directly relevant to the self, not just to our name. In an important early study, Postman, Bruner, and McGinnies (1948) found that people had lower recognition thresholds to words related to their idiosyncratically important values (e.g., religiosity, justice); they saw and reported these words at briefer presentation times than words related to values not as personally important to them.

We are also generally more sensitive to information related to our self-concepts. In one study (Bargh, 1982), participants engaged in a dichotic listening task in which they shadowed or repeated aloud each of a series of words presented to one ear, and tried to ignore words presented concurrently to the opposite ear. On one block of trials, the words presented to the unattended ear were related to the trait of independence. For participants for whom the trait was an important part of their self-concept (see Markus, 1977), the presence of those independence-related words distracted attentional resources from the controlled shadowing task (as measured by a probe reaction time task), indicating that they were detected and processed automatically, outside of awareness (though the control task was able to regulate the automatic process from usurping awareness). In another study that made use of the dichotic listening task, Nielsen and Sarason (1981) showed that participants made more shadowing errors (i.e., were distracted to a greater extent) when words related to their anxieties (i.e., dating, school) were presented to the unattended channel (see also Geller & Shaver, 1976; Hull & Levy, 1979).

Bargh and Tota (1988) used the Markus (1977) adjective endorsement task to assess the efficiency with which the self-concept becomes active. In one condition of the experiment, participants were to judge the self-descriptiveness of each of a series of positive and negative trait adjectives, by saying yes or no as quickly as they could. Half of the participants performed this task by itself, but the remaining participants had to hold a six-digit number (different each trial) in memory while making each judgment, so that the degree to which the two types of judgments required attentional resources could be assessed. To the extent the judgment could be made automatically, response latencies should be unaffected by the concurrent attentional load. Results showed that participants think about themselves automatically in positive trait terms, such that they were just as fast to make those judgments with a concurrent memory task as without it. With negative trait judgments, however, the attentional load manipulation slowed responses, showing that these traits did not become active automatically.

Other research has shown that the effect of attentional load is to make the self-concept more favorable (Paulhus, Graf, & Van Selst, 1989). Thus, if one can use what comes

to mind automatically, when control processes are prevented, as a "truer" measure of what people really believe, then it would seem that people in general have pretty high opinions of themselves. Tice, Butler, Muraven, and Stillwell (1995) have found, however, that we become pretty good at regulating or hiding these smug feelings, at least from friends. They found that one's self-presentations to friends were more modest than to strangers. Moreover, the automaticity of these self-presentational strategies was shown by the fact that when participants were instructed to engage in self-enhancement with friends or modesty with strangers, compared to their natural tendencies to be modest with friends and self-enhance with strangers, their ability to recall the interaction was poorer. Engaging in the opposite self-presentational strategies apparently required more attention, taking it away from external environmental events and resulting in poorer memory for them.

Research by Andersen and her colleagues (e.g., Andersen & Cole, 1990; Andersen, Glassman, Chen, & Cole, 1995) is relevant to the self research, in that it obtains similar effects for the other significant people in one's life (e.g., parents, romantic partners). When we encounter people whose features resemble significant others in some important way, the representation of that significant other becomes activated without the perceiver's awareness by the presence of those features, and that activated representation becomes used to anticipate and interpret the behavior of the new acquaintance. In several studies, if the new stimulus person resembled a participant's significant other, the participant assumed that the target would possess additional characteristics of the significant other as well.

The self may have a quite different effect on the automatic activation of trait information when self-conceptions are unwanted. Newman, Duff, and Baumeister (1997) have found that when people suppress thoughts about their own characteristics, they become more inclined to pick up information about those characteristics in others. This effect appears both when people suppress thoughts about their traits in response to instruction, and when they do so as a result of their own dispositional repressive tendencies.

Such findings put a new spin on the Freudian notion of defensive projection—and suggest its possible roots in ironic monitoring processes underlying the control of thoughts about the self. The person who is most worried and nonplussed about a property of self may be monitoring it so intently as to make it hyperaccessible in perceptions of others (cf. Wegner & Erber, 1992). Perhaps the same set of chronically accessible trait constructs, both positive and negative, may be operating in both self and other perception (Bargh & Tota, 1988; Higgins & Bargh, 1987), but with the addition of a regulatory, self-protective stage of rationalization operating to defend against negative trait construals of the self (e.g., Steele, 1988; Tesser, Martin, & Cornell, 1996).

This latter possibility points to the fact that automatic attention responses are not limited to the self; they occur in response to any form of information that is frequently attended. Frequently attended information is the second kind of "most favored information" for social judgment. Higgins, King, and Mavin (1982) found that in reading about the behaviors of another person, people attended to and later remembered certain kinds of behavior more than others. There were individual differences in terms of which behaviors a person would attend to and remember, predicted by which trait dimensions they listed first in a free response questionnaire about the types of people they encountered in their daily lives. Presumably, those that came to mind first, without prompting by semantic or other associative relations with other dimensions, were those that the individual used very frequently in thinking about other people (see also Wegner, 1977). Higgins et al. (1982) termed these *chronically accessible* trait constructs, in that they led to the pickup of relevant behavioral information without priming or recent use.

Bargh and Pratto (1986) applied the Stroop color-word paradigm to this issue. Participants were to name the color in which each of a series of words was presented as quickly as possible, with the meaning of the word irrelevant (and a distracter) to this task. It was found that participants were more distracted by words related to their chronically accessible constructs than those related to their inaccessible constructs. Because the participant's goal was merely to name the word color, and not to form impressions of anyone, we can conclude from this that automatic attention responses exist for behaviors relevant to a person's chronically accessible personality constructs. Such automatic attention effects have also been extended to the domain of attitudes. Roskos-Ewoldsen and Fazio (1992) obtained the same Stroop-like uncontrollable orientation effect for the names of attitude objects, when the attitudes associated with these objects in memory were made temporarily more accessible by repeated expression.

Thus, it appears that for aspects of one's life one *frequently thinks about*—values, important dimensions of one's self concept and of the behavior of others, and attitudes—the presence of information related to those aspects automatically attracts our attention. These forms of information, then, are more likely than others to be noticed, thought about, and remembered, even if our control processing currently lies with other aspects of the environment.

A third general source of automatic attention responses or "most favored information" is *negative* social behavior, including negative emotional expressions (Fiske, 1980; Hansen & Hansen, 1988; Pratto & John, 1991). People seem to be especially vigilant about negative or potentially threatening social information (Wegner & Vallacher, 1977). In one study, Fiske (1980) instructed participants to form

an impression of each of several target persons whose behavior was conveyed by means of photographs. Participants were allowed to advance at their own pace the slide projector displaying the photographs, and Fiske (1980) surreptitiously measured how long the participant looked at each one as an indication of relative attention. In general, negative behaviors were looked at longer and subsequently were given more weight in the participant's impressions of the targets, than were positive behaviors.

In a related finding, Pratto and John (1991) had participants name the colors in which a variety of personality trait terms were presented (i.e., the Stroop task) and obtained longer naming latencies for undesirable than desirable trait terms. This finding confirms that the greater attention given to the negative social behaviors, as in Fiske's (1980) experiment, is due to an automatic attention response, because participants in the Pratto and John (1991) study could not control the attention-demanding nature of the negative personality information. Pratto (1994) reported further studies demonstrating the strong tendency to orient toward negative social information, in which the greater attention allocation occurred even after participants were told about the effect and encouraged to overcome it if they could.

Features that signal a person's *social category membership* represent a fourth kind of "most favored information" that has privileged access to the mind. Easily discriminable *personal features*—especially the "big three" of gender, race, and age—tend to activate preconsciously the categories or stereotypes associated with them (e.g., Bargh, 1994; Brewer, 1988; Fiske & Neuberg, 1990; Macrae, Stangor, & Milne, 1994), with these stereotypes consisting in part of collections of personality trait constructs (Hamilton & Sherman, 1994; Stangor & Lange, 1994). These features tend to be easily encoded and detectable, such as skin color, and age-related and gender-related characteristics. They are not limited to visual features, however; regional (e.g., Southern United States) and national (e.g., German, Chinese) stereotypes can be triggered by speech accents and dialects as well (especially over the telephone when no visual features are present). Also, the mere presence of features associated with a particular role in society (e.g., a waiter's or police officer's uniform) can also trigger stereotypes associated with that role (see Cohen & Ebbesen, 1979; Taylor, 1981).

To a certain extent, categorizing and pigeonholing people quickly and efficiently in terms of their group membership is adaptive and defensible in that we cannot possibly attend and individuate everyone we encounter. Macrae, Milne, and Bodenhausen (1993; see also Macrae, Bodenhausen, et al., 1994) have found that stereotypes do allow for more efficient processing of information about people, in that less attentional capacity is needed and can thus be devoted to other, goal-relevant tasks. Dijksterhuis and van Knippenberg (1996a) provide evidence suggesting that stereotype activation also inhibits stereotype-inconsistent information from gaining access to control processes. Thinking accurately and completely about anything—including people and attitude issues—takes effort, and unless an individual is especially motivated to engage in this effort, control over the default automatic process is usually not taken (Devine, 1989; Fiske & Neuberg, 1990). And, if the person is not aware that a stereotype has been activated and is influencing his or her judgment, no control is possible anyway (Bargh, 1989; Strack & Hannover, 1996).

Is Stereotyping Inevitable? The automaticity of the pickup of stereotype-relevant information makes one wonder whether stereotyping is indeed obligatory in social judgment. This remains, however, an open question. The evidence to date suggests that automatic stereotype activation depends on the strength of the association between the representation of the group (including distinguishing group features) and the representation of the group stereotype in memory. While for many stereotypes this connection may be so frequently used by most people that it becomes automatic for the average person, for other stereotypes that are less implicitly assumed by members of the culture, this connection may be more tenuous.

Devine (1989) has found that white Americans' stereotype of African Americans becomes active when verbal stimuli related to that stereotype are presented subliminally; thus stereotypes can become activated without the individual being aware of it and consequently, unintentionally, given the presence of group features in the environment. Pratto and Bargh (1991) found that gender stereotypes become active to influence judgments about a target person even under information overload conditions; that is efficiently (see also Macrae et al., 1993). But Gilbert and Hixon (1991) did not find an influence of the mere presence of an Asian-American in a videotape on stereotypic completions of word fragments (e.g., S_Y as SHY instead of SPY) when participants' attentional capacity was loaded by a secondary task (whereas the stereotypic influence did occur in the nonoverload condition). It appears, therefore that stereotypes may vary in their ease or automaticity of activation. Those that are activated more consistently upon the presence of a member of the stereotyped group will be more likely subsequently to become activated unintentionally and efficiently.

One might expect this connection between representation of a group and its stereotypic trait concepts to vary in strength as a function of the prejudice level of the individual. That is, the more prejudiced a person, the more likely he or she activates those stereotypic trait concepts when encountering a member of that group. Devine (1989), however, found that the probability of automatic activation of the African-American stereotype did not fluctuate as a function of scores on the Modern Racism Scale (McCon

hay, Hardee, & Batts, 1981). The subliminal presentation of stimuli related to the stereotype (e.g., musical, lazy, welfare, ghetto) activated the entire stereotype, including content not presented as priming stimuli such as "hostile," for all participants regardless of their responses on the racism scale. Stereotype activation was evidenced by more hostile ratings of a target person in a subsequent impression formation task by those participants exposed to the stereotype-relevant stimuli. Bargh, Chen, and Burrows (1996, Experiment 3) recently found that subliminal presentation of African-American faces to white male participants resulted in increases in the participant's own hostile behavior—a behavioral effect of automatic stereotype activation—and again this effect was not moderated by participants' Modern Racism scores.

In contrast to this, Fazio et al. (1995) have observed individual variations in prejudicial behavior as a function of stereotype strength. They presented participants with the faces of African Americans and whites as part of an explicit memory task; participants were instructed to attend to each of the faces because they would be asked to remember them later (they could, later, at better than chance levels). Following each (brief) face presentation a target adjective appeared that participants were to classify quickly as either good or bad in meaning. Following the logic of the Fazio et al. (1986) study on automatic attitude activation, the authors argued that attitudes toward African Americans could be measured in terms of whether the presence of black faces facilitated responses to negative adjective targets and slowed responses to positive targets, as would be expected if the presence of a black face automatically activated a negative evaluation (i.e., a prejudicial response).

For each participant the degree of such automatic evaluation was calculated. It was found that this score did in fact predict the positivity of the participant's behavior to an African-American experimenter, who during debriefing at the end of the session had coded the participant's friendliness. Thus, variations in the automaticity of the white participants' stereotypic conception of African Americans did appear to exist, and parlayed into behavioral differences with the black experimenter. Modern Racism scores did not correlate significantly with this behavioral measure, though they did with other questionnaire indicants of prejudice (i.e., the perceived fairness of the acquittal of the four police officers in the Rodney King case).

It seems then that individual differences do exist in the automatic activation of stereotypes upon the mere presence of stereotyped-group features, and that the more prejudiced an individual, the greater the likelihood of automatic stereotyping (see also Lepore & Brown, 1997). In part, the discovery of this possibility has been complicated by the use of the Modern Racism Scale in this research, as it has proven somewhat problematic as a measure of these individual differences (see Fazio et al., 1995). At the same time, however, moderation of stereotyping by degree of racism may be limited to situations in which the individual is processing information about the target person in a deliberate and goal-directed way. Just as in the automatic attitude activation literature, the results to date suggest that the greater the degree of control processing of the stereotype-relevant stimuli, the greater the likelihood of obtaining moderation of stereotyping effects by strength of stereotyped beliefs.

Automatic stereotype activation has effects beyond impressions and judgments of stereotype group members. Because of the passive, spreading effects that social perception tends to have on social behavior (cf. Berkowitz, 1984), the perceiver may behave toward the stereotyped-group member in line with the content of the activated stereotype without realizing he or she is doing so. Bargh, Chen, and Burrows (1996; Experiment 2) found that nonconscious activation of the elderly stereotype caused their experimental participants to walk more slowly down the hall (i.e., in line with the "weak" and "slow" features of the stereotype) when leaving the experimental session, and that subliminal activation of the African-American stereotype caused participants to react with greater hostility to the experimenter. In related work, Dijksterhuis and van Knippenberg (1996b) found that participants primed with the "professor" stereotype subsequently scored higher in a game of Trivial Pursuit than did participants primed with the "soccer hooligan" stereotype.

Such evidence raises the spectre of a most insidious way in which stereotypes have influence and can be perpetuated: on being primed with the stereotype of a target, the perceiver produces the very behavior expected from the target. As the perceiver does not intend to behave in this way, and so has no memory of any intention of doing so, any reciprocal behavior prompted from the target is likely to be attributed to the target and not the perceiver. This is particularly problematic in the case of negative stereotypes and behavior. An experiment by Chen and Bargh (1997) has verified this *automatic* "behavioral confirmation" effect (cf. Snyder & Swann, 1978): subliminal priming of the African-American stereotype in one participant caused his or her interaction partner's behavior to be rated as more hostile both by blind coders and by the stereotype-primed participant.

Ironic Effects of Control of Stereotyping It turns out that the control of stereotype-based judgments is not only difficult at times, but may in fact yield exactly the stereotype inferences that one is attempting to control. It is not only, then, that control processes may suffer *intrusion* by automatic stereotype inferences, but that the control processes may themselves *create* such inferences. This is not a simple matter of the *delegation* of a control task to an

automatic process that serves the same purpose as the control process. Rather, the production of such ironic inferences appears to occur as a result of the creation of automatic monitoring processes in the service of conscious control—one which serves a purpose opposite the control process (Wegner, 1994). Part of the mind looks automatically for the stereotypic thought the conscious mind is trying to control.

In their studies of the instructed suppression of a stereotype, Macrae, Bodenhausen, Milne, and Jetten (1994) have found that instructed control of prejudice can be problematic in just this way. These researchers asked participants to suppress stereotype thoughts in imagining the life of a target person belonging to a stereotyped group (a "skinhead"), and then later gave these participants the opportunity to write their impressions of another person of this group. As compared to the impressions of participants who did not first suppress stereotyping, these participants formed more stereotypical impressions of the second target. In another study in this series, Macrae, Bodenhausen et al. (1994) examined the effects of this manipulation on participants' choices of how close to sit to a target just after having controlled their stereotypes of the target in an earlier impression-formation session. As compared to participants who were not instructed to suppress, these participants indeed had created less stereotypical imaginings about the target. However, also as compared to these uninstructed participants, the stereotype suppressors subsequently chose to sit at a greater distance from the target.

According to the theory of ironic processes of mental control (Wegner, 1994), to suppress a prejudiced state of mind is to introduce operating and monitoring processes and their inevitable potential for the production of ironic thoughts and actions. Macrae, Bodenhausen et al. (1994) provided evidence for this in their third study. They examined the effect of stereotype suppression on participants' lexical decision latencies. Participants suppressing the stereotype of a skinhead indeed wrote less stereotypical impressions of him, but at the same time were faster in making correct decisions about stereotype-related words. So, although they were successful in controlling their overall impressions, they appeared to be influenced by an ironic monitoring process that enhanced the automatic activation of stereotype inferences.

A similar eventuality has been tested in research by Wegner, Erber, Bowman, and Shelton (1996) on the mental control of sexism. Participants for one study were given the task of completing sentences that prompted sexist responses (e.g., "Women who go out with lots of men are ____," either under time pressure (mental load) or without such pressure. Some participants were instructed not to be sexist in their completions, whereas others were given no particular instruction. Ratings were made by observers of the degree of sexism in each sentence completion. It was found that without the imposition of time pressure, participants indeed made fewer sexist responses when they were trying not to be sexist. However, with time pressure imposed, participants made more sexist responses when they were trying not to be sexist than when they were not attempting any mental control at all. The desire to control sexist responding, under the conditions of diminished cognitive resources produced by time pressure, created the ironic tendency instead to blurt out sexist remarks.

This ironic tendency was observed in a second experiment that called for participants to respond rapidly to sexist and nonsexist statements by judging them true or false (Wegner, Erber et al., 1996). When participants were specifically instructed not to be sexist, they made unwanted judgments (calling a sexist statement true or an egalitarian statement false) more quickly than desired judgments (calling sexist statements false or egalitarian statements true). Without the instruction not to be sexist, these judgments were all made with similar latencies. In both of these experiments, the ironic effect was similar for both males and females—and was no more pronounced for people of either sex who were high in dispositional sexism. This suggests that extreme underlying attitudes may not increase the likelihood of ironic monitoring errors

Behavior Categorization Effects We have been concerned thus far with automaticity and control primarily in the pickup of social information. A next step in social judgment is connecting social information to more abstract conceptions of personality. Now as it happens, social behaviors, once perceived, tend automatically to activate personality trait constructs to which they unambiguously correspond (Carlston & Skowronski, 1994; Moskowitz & Roman, 1992; Srull & Wyer, 1979; Winter & Uleman, 1984).

In initially proposing this idea, Smith and Miller (1979) suggested that such trait categorization is a pervasive response we make to any and all behaviors, even when we aren't trying to form impressions of the actor. To the extent the features of the behavior match closely with the features of the trait representation—that is, if the behavior is unambiguous and clearly diagnostic of that trait—the trait category is activated as part of perceiving the behavior. But if the behavior is vague or ambiguous, open to more than one interpretation, then which category is used to interpret it becomes a matter of the relative accessibilities—or ease of activation—of the various relevant categories in memory (Bruner, 1957; Higgins, Rholes, & Jones, 1977). It is important, conceptually, to separate this categorization of the behavior in trait terms from any subsequent attributional processing in search of the cause of the behavior (e.g., Trope, 1986).

Several lines of research document the automaticity of this categorization process. Srull and Wyer (1979) primed the trait concepts of hostility or kindness in their participants by exposing them to scrambled versions of hostile or kind behavior descriptions ("the kick shoe dog") as part of an alleged test of linguistic ability. That these behaviors unintentionally activated the corresponding trait concepts was shown subsequently by more extreme ratings of a target person along that trait dimension. This effect was replicated by Moskowitz and Roman (1992), who produced similar priming effects through having participants memorize trait-relevant behavior descriptions. Although in these studies the participant's control processing task had nothing to do with personality or social judgment, the behavior descriptions nonetheless activated the relevant trait concepts.

The studies reviewed in the previous section provided participants with behaviors that were clearly diagnostic of a given personality trait. In such cases, as long as the person has sufficient experience in encoding that behavior and similar behaviors as instances of the trait in question, the mere occurrence of the behavior activates the trait concept in memory. This is a data-driven or "bottom-up" effect of the environmental information on categorization. Knowledge is activated to the extent it is *applicable* to the environmental event (e.g., Higgins, 1989, 1996). However, often social behaviors are ambiguous, open to more than one interpretation (Bruner, 1958). Was the person whom we saw running down the street late for something important, rushing to help a family member in trouble, trying to escape after committing a crime, or just trying to get some exercise?

When behaviors are not clearly diagnostic of a personality trait, two things can happen. One is that the perceiver engages in a "search after meaning" (Postman, 1951): a controlled consideration of the features of the behavior and its match with stored features of various relevant trait concepts and other knowledge structures. For example, let's say that our street-runner was dressed in a business suit. That doesn't fit our schema for someone out for some exercise, so we can move on to other, more likely reasons. The second thing that can happen in the case of ambiguity is that one of the relevant trait concepts may be accessible enough in memory that it captures the behavior (Bruner, 1957; Higgins & King, 1981), producing by its top-down effect the same categorization as would have been produced if the behavior itself was more diagnostic.

Trait concepts can become more accessible—and thus likely to capture relevant though ambiguous behaviors—either through long-term frequency or recency of use. Those concepts that are applied again and again by the person in the controlled perceiving and judging of self and others eventually become *automatized* and capable of activation by the mere presence of the relevant behavior in the environment, regardless of the current focus of controlled attentional processing (Bargh, 1984; Bargh & Pratto, 1986; Bargh & Thein, 1985; Higgins, King, & Mavin, 1982). As proposed by Smith and Branscombe (1988), these chronically accessible trait constructs correspond to very efficient behavior-to-trait encoding pathways. Thus, even when attention is overloaded, these constructs detect and process relevant behaviors (Bargh & Thein, 1985). And chronically accessible constructs also capture and encode behaviors that are ambiguously relevant to that trait, so that the perceiver considers them diagnostic of that trait (and so influencing the impression of the target on that trait dimension) when other perceivers—who don't have that construct chronically accessible—would not (Bargh, Bond, Lombardi, & Tota, 1986; Bargh, Lombardi, & Higgins, 1988).

Trait constructs also can become temporarily more accessible than other relevant ones if they have been used recently (i.e., "primed"). Higgins, Rholes, and Jones (1977) showed that if participants had been exposed to a trait term (e.g., adventurous, brave) recently as part of a task having nothing to do with personality or social perception, they were more likely to interpret a subsequently presented ambiguous behavior (e.g., "he sailed alone across the Atlantic") in terms of that trait instead of other potentially relevant trait concepts (e.g., reckless, completely nuts). Subsequent studies have replicated this finding and explored its parameters (e.g., Bargh & Pietromonaco, 1982; Erdley & D'Agostino, 1987; Srull & Wyer, 1979).

What is important about trait construct accessibility is that it produces automatic behavior-to-trait encodings just as if the behavior was not ambiguous but instead clearly diagnostic. The individual is not aware of the influence of accessibility on the ease or fluency of the perceptual process, just that the behavior seemed clearly relevant to that trait and that no effortful search after meaning was necessary. People may use the felt ease of categorization as a cue to its validity, and trust perceptions that require little or no effort more than those that do.

For example, Sherman, Mackie, and Driscoll (1990) had participants evaluate the effectiveness of politicians. Information about the politician's abilities in both foreign affairs and in domestic affairs (e.g., managing the economy) was presented. Participants had been primed beforehand, however, on dimensions relevant to one or the other ability domain. Results showed that the primed dimension was subsequently given more weight in the participant's overall evaluations, consistent with the hypothesis that the participant would attribute the greater processing ease or fluency caused by the priming to the diagnosticity of the information itself.

What the priming literature shows is that people are typically not aware of the impact that their internal perceptual readinesses play in their interpretations of the social environment and will misattribute the apparent clarity of the perceptual interpretation produced by that readiness or

accessibility to the clarity and unambiguity of the information itself. This is both good news and bad news. Taking the bad news first, priming and other accessibility influences operate as nonconscious biases, and if a person is not aware of a source of bias, he or she cannot adjust or control for it (Bargh, 1989). The good news is that the "bias" may be less of an error than a reflection of the individual's frequent or recent experience; in a way, then, accessibility influences add in "priors" or base-rates of behavioral probabilities into the interpretation equation (see Higgins & Bargh, 1987; also Anderson, 1990).

Assumed in this discussion is that priming results in the assimilation of the ambiguous behavioral information into the accessible category; that is, the behavior is seen as an instance of that trait. This is the passive or automatic effect of priming. However, if the person is aware of possibly having been influenced by the priming events, *regulation* occurs and control is exerted over that influence. Herr, Sherman, and Fazio (1984) showed that when extreme examples of a trait-type are used as primes (e.g., Dracula as a prime of the trait of hostility), the outcome is contrast away from, rather than assimilation into, the category. The observation "Donald demands his money back at a store" pales somewhat as an instance of hostility compared to the practice of sucking the blood out of countless victims. One possible reason for the contrast effect (instead of assimilation) is that extreme primes are especially memorable, and so are likely to still be in consciousness later on when judging the ambiguous target behaviors. This is consistent with the principle that for control over a social judgment to be exerted, the individual must be aware of the (potential) influence.

Additional support for this interpretation comes from several subsequent studies (Lombardi, Higgins, & Bargh, 1987; Newman & Uleman, 1990; see Strack & Hannover, 1996) in which awareness of the priming events at the time of the later impression formation task resulted in contrast effects, while a lack of residual awareness resulted in assimilation effects. Awareness was assessed by seeing if participants could still recall any of the earlier priming events. Another manipulation likely to increase the chances that the priming events will still be in consciousness later at the time of the impression task—a more effortful processing of the priming stimuli by participants (Martin, Seta, & Crelia, 1990)—also results in contrast instead of assimilation effects.

Intriguingly, there seems to be something automatic about this control process, because all that was required to produce contrast in the Lombardi et al. (1987) study was that the priming stimuli were still in consciousness enough to be recalled; participants were not aware of how they were being influenced by those priming stimuli, which had been presented (as is usual) as part of a separate, earlier experiment.

Control over a priming effect need not always result in contrast effects, however. Wegener and Petty (1995) have shown that it depends on that participant's theory of how he or she might have been influenced by the prime. If the theory is that the effect should be one of contrast, such as judging the desirability of Salt Lake City as a vacation destination after being primed with names such as Bermuda and San Francisco, then the control process results in assimilation, not contrast, to the primed categories.

Finally, it appears to be possible for control over priming effects to be exerted even before the primes have been presented. Thompson, Roman, Moskowitz, Chaiken, and Bargh (1994) informed some participants that they would have to justify and defend their judgments to others later on. This "accountability" manipulation (Tetlock, 1985) prevented subsequently presented priming stimuli from influencing impressions for these participants, while participants not made to feel accountable showed the usual assimilative priming effect. Apparently, motivations to be accurate can protect even against priming influences on judgments.

Are Social Judgments Made Automatically? Once social information is detected and comprehended—and has activated trait categories, stereotypes, and other stored information in memory—are there automatic ways in which these sources of information are subsequently used? Research on the automaticity of social judgments has shown, for the most part, that impressions and other judgments are not made unless the individual has both the *intention* and the *attention* (i.e., enough processing capacity) to make them (Bargh, 1989, 1990). Bargh and Thein (1985), for example, gave participants explicit instructions to form an impression of a target person, but those for whom attentional resources were in short supply (due to rapid presentation of the relevant information) were not able to do so while the target information was being presented.

What if the participant had the attention but not the intention? Chartrand and Bargh (1996) presented to participants the same information as in the Bargh and Thein (1985) study, giving them plenty of time to read and consider each behavior, but with no explicit instructions other than to read them in order to answer questions about them later. Participants in the control condition showed no signs of having formed an impression about the target person. (The impression-formation goal was primed subliminally for other participants in the experiment, and they *did* form an on-line impression of the target.) Thus, it appears that both the intention to form an impression and the attentional capacity to do so are necessary ingredients if judgments are to be made.

Research on the *spontaneous trait inference* effect (Lupfer, Clark, & Hutchison, 1990; Newman & Uleman, 1989; Winter & Uleman, 1984; Winter, Uleman, & Cun-

niff, 1985) also typically asks participants to memorize behavior descriptions that are clearly diagnostic of a certain trait (e.g., "The plumber took the orphans to the circus"). After the study phase of the experiment, a cued recall test is given in which participants try to remember each of the sentences. Different types of cues are given, some related to the actor of the sentence (e.g., "pipes"), some to the gist of the sentence (e.g., "enjoyable outing"), and some corresponding to the trait implications of the behavior (e.g., "kind"). To the extent that participants had spontaneously—unintentionally and in the course of memorizing the sentence—encoded it in terms of a personality trait, this trait cue should produce the highest recall. In an often-replicated finding, the trait cue does increase the retrievability of the behavioral portion of the sentence, again confirming that behaviors are unintentionally encoded in terms of trait concepts.

An important issue in this line of research is whether the encoding of behaviors in trait terms stops with trait categorization, or continues on to the encoding of the target person—the actor—in terms of that trait concept as well. This would be tantamount to automatic dispositional attributions, going directly from the perception of a social behavior to an encoding of the actor as having the personality trait exemplified by that behavior.

The evidence for such preconscious dispositional attribution is mixed. Although Winter and Uleman (1984) obtained superior recall of the behavioral portion of the sentence stimuli with trait cues, recall of the sentence actor was not facilitated, as would be expected if participants had been attributing that trait automatically to the actor. Bassili and Smith (1986) and Lupfer et al. (1990) replicated these findings using the original paradigm, in which participants were not trying to form an impression of the actor; but in experimental conditions in which participants did have the conscious impression goal, the trait cue did later facilitate recall of the sentence actor (Bassili & Smith, 1986; Moskowitz & Uleman, 1994; D'Agostino, 1991). It would seem from these studies that the preconscious effect is limited to trait categorization of the behavior, but that causal attribution for the behavior in terms of the actor's personality is a goal-dependent consequence of trying to form an impression of him or her.

In line with this conclusion, Gilbert and his colleagues have found that when participants have the intention of forming an impression of a person, they do go directly from the target's behavior to an attribution of the cause of the behaviors to the target's personality or disposition (e.g., Gilbert, 1989, 1998, in this *Handbook*; Gilbert & Krull, 1988; Gilbert & Malone, 1995; Gilbert & Osborne, 1989; Gilbert, Pelham, & Krull, 1988). Given that the individual is motivated to form an accurate, detailed impression of the target person (see Fiske & Neuberg, 1990), he or she will typically examine the situational context in which behavior takes place when developing an attribution for its cause. What Gilbert's research has shown is that the first step in this attribution process—given the goal to form an impression—is an automatic attribution of the cause to the target's personality. He has demonstrated this by preventing the control process, which requires attentional capacity, from operating by distracting participants with a second task. When attentional capacity is not loaded through this cognitive busyness manipulation, participants are influenced by clear situational constraints on a target person's behavior—such as a person looking anxious and embarrassed when asked publicly to describe her sexual fantasies. But when instructed to report each of a series of numbers scrolling by on the videotape monitor on which they are watching the target person, participants disregard the situational constraints and conclude the target is dispositionally anxious (Gilbert et al., 1988).

The spontaneous trait inference and cognitive busyness research combine to show that behaviors are unintentionally encoded in terms of personality trait constructs, and, especially if the goal of forming an impression is operative, the person who performed those behaviors may also be automatically encoded as possessing those traits. However, going from behaviors to traits is not an innate cognitive function. We must first learn what behavioral features stand for each trait, and only when we engage in this encoding procedure sufficiently often does the associative pathway between behavioral features and trait constructs become automatized.

Newman (1991), for example, examined the development of spontaneous trait inference propensities; first-graders rarely made even intentional trait inferences, but the tendency to use trait concepts to understand behavior blossomed in fifth-grade students (in fact, fifth-graders were more likely to infer traits spontaneously than were adults). Smith (e.g., Smith, Branscombe, & Bormann, 1988; Smith & Lerner, 1986; Smith, Stewart, & Buttram, 1992; for reviews see Smith, 1994, 1998, in this *Handbook*) has found that the efficiency (speed) with which behaviors are encoded in terms of traits increases with practice. Bassili (1993) found too that prior practice in making trait inferences from behaviors increased the probability of participants' spontaneously making them later. Newman (1993; Uleman, Newman, & Moskowitz, 1996) reported both cross-cultural and individual differences in the occurrence of spontaneous trait inferences.

Taken together, the lesson of these findings is that behaviors are encoded spontaneously and unintentionally in terms of the trait constructs for which they are relevant, at least for the more frequently used trait dimensions, and when there is sufficient processing capacity to make the inferences. Efficiency in trait categorization, on the other hand, comes with practice in applying that category (e.g., Bargh & Thein, 1985).

Automatic Activation of Judgment Standards There are other aspects of the judgment process besides informational input that can exert unintended, automatic influences. Judgments involve a comparison of the observed behavioral event to a comparison standard (e.g., Helson, 1964; Biernat, Manis, & Nelson, 1991), with the event being either assimilated to or contrasted against that standard. Higgins and Stangor (1988) found in a *change of standard* effect that if one keeps the informational input the same, but changes the judgment standard, the judgment is changed as well. This accounts for why it may seem to us that it snowed more when we were kids than now as adults, because back then it frequently came all the way up to our knees.

Because judgments involve a comparison of input to a standard, automatic activation of standards can exert an unseen influence on judgments just as can automatic informational input. Several studies have now demonstrated such effects. Baldwin, Carrell, and Lopez (1990; see also Baldwin & Holmes, 1987) subliminally primed participants with the faces of significant others in their lives and showed an effect of these primed standards on participants' self-evaluations. Strauman and Higgins (1987) presented participants with stimuli related to either their self-standard for how they ought to be or to their self-standard for who they ideally want to be. These stimuli automatically produced physiological reactions in line with the emotions associated with these standards (i.e., anxiety/higher arousal to the activated ought standard, dejection/lower arousal to the activated ideal standards), as predicted from the fact that participants' opinion of the actual self was significantly discrepant from these standards.

Summary In general, informational input to social judgment as well as behavioral response processes can be furnished either through automatic or control process means. The preconscious automatic processing of certain features of people and their behavior occurs, by definition, regardless of the current focus of control processing (i.e., *multitasking*). If there is no current control process operating to pick up information relevant to it, then subsequent social judgment processes will, by default, be based largely on automatically furnished sources of input (Bargh, 1989). Current purposes add into the mix the forms of information relevant to those purposes; for example, if one is motivated to form an accurate, fleshed-out impression of an individual, the control process will attend to and pick up individuating details about that person, so that the impression will not be based only on the automatically supplied input (largely stereotypic assumptions based on easily observable features; see Fiske & Neuberg, 1990).

There are a variety of internal representations that become activated automatically in the course of social life, such as attitudes, representations of social groups, anything to do with one's sense of self, and whatever is relevant to achieving one's current goals. Not only do these activated representations then play a major role in one's impressions and judgments about the situation, they also directly and nonconsciously affect one's behavior in it. All these automatic effects—from attitude activation to stereotype activation to behavior categorization—appear to be more pervasive and general when the environmental event is not currently the focus of control processing, and to vary in probability as a function of one's frequency of experience with the event when it is the current focus of deliberate processing.

Emotion Experience

In the traditional philosophy of emotions, the passions arise in us only to be overcome by reason. Emotional states happen to us automatically, in other words, and then we may try to stop them through the implementation of some control process (Clark & Isen, 1982; Gilligan & Bower, 1984; Öhman, 1993). So, for example, we automatically get angry when we are provoked by a bad driver and then we try to control this anger, ideally before we get out of the car and bite someone. As it happens, though, automatic starting and controlled stopping are not the only processes governing emotional experience. There are times when it is useful to think of controlled starting of emotions (as when our conscious thought processes help us to understand what emotion we should be feeling in an ambiguous situation), and there are also instances when automatic stopping becomes evident (as when we anticipate fear or sadness and immediately try not to think about it). In this section, we consider separately the cases of emotion-relevant processing suggested by the fourfold table of automaticity versus control and starting versus stopping.

Automatic Starting The automaticity of emotion onset seems almost definitional of the concept of emotion. Emotions typically interrupt our activities, reorienting us toward something we had not been considering (Simon, 1967). We may have the conscious goal of emptying the wastebasket, for example, and be interrupted by an emotional reaction when we see something disgusting at the bottom. Mandler (1984) points out, though, that emotional interruptions do not invoke irrelevant or bizarre concerns. Rather, they reorient us toward items that we may not have currently been considering in consciousness, but that are background concerns that always matter in some sense, and that probably should be considered consciously *at this time*. In this sense, the processes that produce emotions may be said to yield unconscious vigilance for items of potential significance to us.

The idea that emotion onset is automatic comes from a

variety of literatures, most of which point to the "basicness" of emotional expression and behavior. Emotion seems basic in view of the similarity of human emotional behavior to animal emotional behavior (Andrew, 1963), the early development of emotional responses (Emde, 1984) and processes of emotion imitation (Haviland & Lelwica, 1987), the evolutionary primitiveness of some of the brain centers that govern emotion (MacLean, 1993), and the cross-cultural similarity of emotion expressions (Ekman, 1992). These observations point to an evolutionarily fundamental behavior production system. It is unlikely that behaviors emanating from such an apparently innate system (Frijda, 1986) would not be automatic in several important senses. Analyses and reviews of research on the automaticity of emotional responses (Clark & Isen, 1982; Gilligan & Bower, 1984; Hansen & Hansen, 1994; Öhman, 1993; Pratto, 1994) point to the wide range of contemporary cognitive and social research that is consistent with this general hypothesis.

Research has assessed automaticity directly, for example, by establishing that emotional behavior and experience can occur without awareness or cognitive effort. Corteen and Wood (1972) performed an important study suggesting this possibility, in which participants attended to a prose passage presented to one ear while repeating it aloud. At the same time, a list of city names was presented to the nonattended ear. Participants who had previously experienced mild electric shocks linked with some of the city names showed higher skin conductance level (SCL; a measure of autononic nervous system arousal) during the presentation of those names as compared with others, whereas participants without such prior experience did not show this response. This result was replicated by Corteen and Dunn (1974) when additional checks were made to ensure participants' lack of awareness of the city names that were presented.

A different approach to the automaticity of emotional responses was initiated by Zajonc (1980) with the theory of affective primacy, as mentioned earlier. The affective primacy theory has received a different sort of test in more recent research by Murphy and Zajonc (1993). These studies examined participants' affective responses to Chinese ideographs that were presented following either extremely brief presentations or longer presentations of smiling or frowning faces. The briefly presented faces generated shifts in participants' preferences for the ideographs, whereas the faces presented at longer durations did not. This interesting finding suggests that emotional priming may be more effective when it occurs without consciousness than when it occurs with consciousness.

It makes sense that emotions are more compelling and intense when they intrude upon our consciousness as the result of automatic processes than when they are brought into consciousness as the result of conscious intention. This idea is reflected in Proust's *Law of Intermittence,* that "emotion-laden stimuli that leave one cold when sought out or turned to in thought may move one strongly when stumbled upon" (Frijda, 1986, pp. 427–428). Wegner and Gold (1995) suggested that this effect might explain why the suppression of emotional thoughts enhances subsequent emotional reactions to those thoughts (cf. Wegner, 1992; Wegner et al., 1990). The intrusive, automatic return of emotional thoughts stirs emotional experience following suppression more than the controlled appearance of such thoughts that occurs when we intend to entertain them. Wegner and Gold found marked emotional reactions (i.e., increased SCL) in participants who had just finished trying to suppress the emotional thought of a still-desired old flame. The *intrusion* relation between control and automaticity may thus have relevance for the experience of emotion.

Controlled Starting The initiation of emotional experience through control processes represents an interesting counterpoint to the literature on automatic initiation. The idea that people might, under certain circumstances, consciously or effortfully participate in the creation of their own emotions has surfaced only sporadically in the literature, usually just in the form of the hypothesis that people try to be happy (Clark & Isen, 1982; Klinger, 1982; Zillmann, 1988). Although this is an important observation, there are reasons to believe that control processes may participate in the production of a far wider range of emotional experience. As Ekman, Friesen, and Simons (1985) have suggested, some degree of conscious regulation may even be inherent in all emotional experience, differentiating it from simple reflexes such as the startle response.

One line of thinking in this regard is suggested by Schachter and Singer's (1962) analysis of the role of "epistemic search" processes in the production of emotion. Their theory proposed that the effect of an emotional stimulus is to initiate a generalized form of autonomic arousal, and that, to the extent such arousal is unexplained or not easily attributed to an emotional stimulus, the further effect is the creation of a cognitive search for emotion-relevant information. Although Schachter and Singer did not specify whether this search process is likely to be automatic or controlled, subsequent research has suggested that it could require monitoring—at least one harbinger of a control process. In particular, Wegner and Giuliano (1980, 1983) found that arousal created conditions of self-focused attention, in that participants who had exercised were subsequently more inclined to select first-person singular pronouns to complete ambiguous sentences. The related findings that experimentally enhanced self-focused attention tends to intensify emotion experience (Scheier & Carver, 1977) while decreasing susceptibility to emotion misattribution (Gibbons, Carver, Scheier, & Hormuth, 1979) sug-

gest that the operation of this monitoring process does function to instigate effective labeling of emotional states.

The notion that control processes are involved in emotion appraisal brings with it the implication that emotional situations and the emotions themselves may differ in their reliance on automatic versus control processes. Certain broad or important emotional meanings (in particular, the positive-negative dimension) might exert their influences on the person quite automatically, whereas other meanings might require significant cognitive effort and conscious reflection to appreciate (see Leventhal, 1979; Scherer, 1984; Zajonc, 1980). Many emotional states, then, might be "fine points" placed on our automatic responses, in the sense that they require the operation of conscious processes even for the emotion to be felt. The specific emotion one feels in a grocery store upon having someone push a cart over one's foot, for example, might begin automatically with some global negative feeling, and then resolve over time with a conscious review of the circumstances into a specific feeling of anger or annoyance.

Controlled Stopping The role of control processes in emotional experience is, as we mentioned previously, usually understood as an inhibitory one. The prototypical emotion control processes are, after all, the defense mechanisms, and their role in protecting the individual from unwanted negative emotions is widely celebrated in Freudian psychology. The operation of defense mechanisms has not been empirically verified in a satisfying way by psychoanalysis proper, but the reconceptualization of such processes in terms of emotion control has occurred in many quarters (e.g., Lazarus, 1966, 1975; Meichenbaum, 1977) and has produced a rush of research and discovery.

The basic theme in this research is that people often desire to avoid certain emotional experiences, and they therefore perform significant mental and behavioral work in the attempt to prevent or terminate them. Research has indicated, for instance, that people attempt (with variable success) to control sad moods (Clark & Isen, 1982; Morris & Reilly, 1987; Salovey, Hsee, & Mayer, 1993), depression or sorrow (Nolen-Hoeksema, 1993; Pennebaker, 1989; Tait & Silver, 1989; Wenzlaff, 1993), anxiety and worry (Roemer & Borkovec, 1993), pain (Cioffi, 1993), and anger (Tice & Baumeister, 1993). On occasion, even positive emotions are controlled when they become unwanted (Erber, Wegner, & Therriault, 1996; Parrott, 1993). These control processes include behavioral attempts to avoid situations that would evoke the emotions, as well as processes that are more specifically targeted at the suppression of mental contents and behavioral expressions associated with the emotion (cf. Schneider, 1993; Wegner, 1989).

Emotion control processes vary in their effectiveness for two key reasons: *strategy choice* and *control expertise* (Wegner, 1994). Like any form of mental control, emotion control depends on how it is done and how well it is done. Strategy choice is a key element of emotion control because many strategies can simply be faulty, not up to the job. The person who tries to overcome social anxiety by envisioning the awkwardness and weirdness that could happen in an upcoming social encounter, for example, is not likely to enjoy much control over this emotion. Strategies vary dramatically in their effectiveness for emotion control, as clinical research clearly documents (e.g., Klinger, 1993), and quite different strategies are needed, too, for the control of different emotions (Frijda, 1986). The most nettlesome problem in strategy choice, though, occurs because people do not seem naturally to appreciate the fact that simple suppression strategies usually backfire. There is now a considerable body of evidence to indicate that while thoughts themselves might subside for a time (e.g., Kelly & Kahn, 1994; Wegner & Gold, 1995), emotions are often intensified by our attempts to suppress thoughts about them (Foa & Kozak, 1986; Pennebaker, 1990; Rachman, 1980; Wegner et al., 1990; Wegner & Gold, 1995; Wegner et al., 1993). Strategies involving distraction or reinterpretation that differ from suppression only subtly may, nevertheless, be quite helpful (Nolen-Hoeksema, 1993; Wegner & Wenzlaff, 1996), and for this reason the complexities of strategy choice can be challenging indeed.

The second general factor in the effectiveness of emotion control is the individual's level of expertise in controlling the emotion. Often, this just comes down to practice. The depressed person has frequently pushed sadness from mind, for example, and so becomes somewhat adept at doing this under certain conditions (Wegner & Zanakos, 1994). So, while emotion control may be conscious and intentional, it can benefit from the kinds of automatization processes that occur with frequent use. Still, the automaticity of emotion control that is achieved by a depressed person who repeatedly tries not to entertain sad thoughts, or the anxious person who attempts recurrently to avoid thoughts of the anxiety-producing situation, is likely to be fragile. One typical emotion control strategy in depression, for example, is to focus constantly on the future in a fierce attempt to find a way out of the current situation; usually these repeated attempts fail and the individual is left with a chronic and negative set of beliefs about the future (Andersen, Spielman, & Bargh, 1992). Moreover, because attempts to control emotion frequently call for strategies that can instigate ironic processes, even practiced control processes can occasionally introduce ironic monitoring that reinstates the unwanted emotion intrusively and repeatedly. It may be only when emotion control processes become so skilled as to be deployed without conscious intent that they can quell emotion without inadvertently creating it.

This line of thinking suggests that a range of emotional

sensitivities usually ascribed to automatic emotion starting might rather be considered in terms of the ironic effects of controlled emotion stopping. What has come to be known as the emotional Stroop effect, for example, is often considered a unique sensitivity to emotional stimuli held by people suffering from emotional disorders. Watts, McKenna, Sharrock, and Trezise (1986) found that individuals with anxiety disorders are likely to take longer to name the color of a word when that word is relevant to their anxiety stimulus, and this effect has been observed now for depression and several other emotions (Dalgleish & Watts, 1990). The related effect observed by Pratto and John (1991), and also by McKenna and Sharma (1995), is interference with color naming for negative emotion words even among normal participants. This kind of sensitivity might be traced either to automatic emotion starting processes (such as those mentioned previously in the discussion of automatic attitude activation), or to the ironic, automatic effects of conscious stopping processes (Wegner, Erber, & Zanakos, 1993). If conscious stopping can have such undesirable ironic effects, it may be that stopping might better be carried out without conscious direction at all. This possibility is the focus of the next section.

Automatic Stopping There are cases when the desire to avoid emotion may be itself uncontrollable, unintentional, unconscious, or relatively effortless. Frijda (1988) has proposed such "involuntary emotion control," remarking that "one cannot at will shed restraint, as little as one can at will shed anxiety or timidity" (p. 355). The automatic inhibition of emotion makes sense as a way to understand the contemporary literature on emotion repression (Erdelyi & Goldberg, 1979; Weinberger, Schwartz, & Davidson, 1979). Inhibitory processes may occur prior to or during emotional response, and these need not be initiated through conscious control.

Indeed, it often seems that the desire to avoid emotional states in certain forms of psychopathology is as deeply and insistently experienced as the emotion itself. Reiss, Peterson, Gursky, and McNally (1986), for example, find that the sensitivity to anxiety has dispositional properties. Wegner and Zanakos (1994) reported that the tendencies to suppress thoughts in general and to avoid sad thoughts in particular are also reliable dispositions. The compulsion people feel to avoid their unwanted emotions is remarkable, and some people seem to feel this compulsion more than others. Curiously, though, when people do report conscious interest in suppressing emotion, they seem to be particularly awful at it. Conscious preoccupation with the avoidance of anxiety or depression, in contrast to the trait of defensive repression signaled by reports of low anxiety and high social desirability (as in Weinberger et al., 1979), is associated with chronic high levels of the very emotion that is unwanted (Wegner & Zanakos, 1994).

Unfortunately, most of the current evidence on differences between conscious and automatic emotion stopping comes from individual-difference findings that do not allow the clear analysis of psychological process. This evidence suggests, though, that it may be useful to pursue the hypothesis that the effectiveness of emotion stopping turns on its consciousness. Emotion inhibition may work quite effectively as long as the person is unaware of its operation. When automatic processes that inhibit emotion are overridden by conscious intention, however, ironic processes surface to increase the accessibility of the very emotional thoughts and sensations that are being inhibited, and the result is the intrusion of emotions (Wegner, 1994). Just as one may carry a brimfull cup of coffee across the room without a lurch as long as one is not thinking about it, only to spill at the very moment one tries consciously not to spill, emotion inhibition processes that come into consciousness may activate the unwanted emotions.

Expressive Behavior

Some social behaviors occur more or less naturally and spontaneously, expressing responses to situations or internal states. Others appears to be generated on purpose to create an impression. These observations have long been important in the study of nonverbal behavior and self-presentation. The distinction between involuntary and voluntary expressions was made early in the study of facial expression (Darwin, 1872; Duchenne de Boulogne, 1862/1990), and related distinctions between expressive behavior that is spontaneous, genuine, or natural as opposed to intentional, posed, or deceptive are made in the study of self-presentation and nonverbal communication more generally (DePaulo, 1992; Ekman & Friesen, 1975; Goffman, 1959; Jones & Pittman, 1982; Paulhus, 1993; Schlenker, 1980).

These literatures are reviewed elsewhere in this *Handbook* (Baumeister, 1998; DePaulo & Friedman, 1998), but we wish to consider three key topics of this area here: the anatomical substrate of control and automaticity, the difficulty of control, and the social perception of control and automaticity.

Anatomy of Control and Automaticity The literature on expressive behavior reveals that the distinction between automatic and conscious control of behavior in some cases can be drawn not just psychologically, but anatomically. Genuine and posed facial expressions, it seems, differ both in the muscles and nerves involved. In the case of muscles, for example, whereas muscles around the mouth are enervated in posed smiles, those surrounding the eyes become involved in spontaneous or "Duchenne" smiles (Duchenne de Boulogne, 1862/1990; Ekman, Davidson, & Friesen,

1990). And more generally, the muscles in the lower half of the face are more open to voluntary control than those in the upper half (Ekman & Friesen, 1975). It is interesting that the most "voluntary" parts of the face are also those involved in talking.

The differing neural pathways of voluntary and spontaneous facial expressions have been traced in detail. According to Rinn's (1984) comprehensive review, volitionally induced movements of the face arise in the cortical motor strip and course to the face through the pyramidal (cortical) tract. Impulses for spontaneous emotional facial expressions, in turn, arise from a phylogenetically older motor system known as the extrapyramidal motor system. Just as the cortex produces intelligent and flexible behavior in general, while subcortical processes yield heartbeats, sneezes, and yawns, it appears that the more flexible forms of facial expression arise cortically whereas the less flexible forms arise subcortically.

These differing pathways are particularly clear in the double dissociation of the voluntary and spontaneous facial expression systems found in clinical cases (Rinn, 1984). Some patients show "mimetic facial paralysis" in which the facial muscles can be moved voluntarily, but all spontaneous movement is lost. Other patients, in turn, show involuntary laughing and/or weeping (with only slight or no provocation), but with an inability to inhibit these responses voluntarily. In the case of facial expression, then, automaticity and control appear to be highly differentiated anatomically. Although it may not be the case that such distinct systems produce automatic versus controlled behavior of other kinds, the possibility of such partitioning may be worthy of further study.

Difficulty of Control Perhaps the most emphatic theme in the literature on expressive behavior is the difficulty of expressive control. The control of nonverbal behavior for self-presentational purposes often sets control processes against automatic processes, after all, and this *regulation* conflict is often won by automaticity—so to result in *intrusion*. Ekman and Friesen (1969) dubbed this phenomenon "nonverbal leakage," the occurrence of uncontrolled expressive behavior reflecting the person's genuine emotions or attitudes even in the face of attempts at the conscious control of social impressions. We all know what it is like to plan to be nice to someone we dislike, for example, only to encounter the person and have our intended smile twist into a demented grimace.

The central problem of the control of expressive behavior is that there seems to be so much to control. To create a positive impression on a potential employer in an hour-long interview, for example, one might potentially try to control one's words, of course, but also facial expressions, gestures, postures, leanings, sighs, and vocal intonations. This is not to mention the control of coughs, yawns, eye-rolling, sneezes, blushes, itches, hooting, and all the other little horrors of interview hell. The accumulated literature on nonverbal communication shows that the failure to control almost any of these little acts can yield an unwanted interpretation (e.g., DePaulo, 1992; Ekman, 1985), and the prospect of trying to control all of this, or even just some tiny part of it, seems not just daunting but preposterous. How does a person ever fool anyone in everyday life?

One avenue to successful control is *automatization*. The repeated practice of self-presentational strategies may result in fluid and well-integrated performances that can be deployed at will (DePaulo, 1902; Jones & Pittman, 1982; Paulhus, 1993). Expressive actions that were once deliberate can take on the appearance of genuineness when they flow so well that they no longer require conscious control. The added benefit of automatization is that individual expressive acts become linked together such that each one need not be thought about or controlled individually, and instead the entire sequence becomes performable as one piece. Vallacher and Wegner (1985, 1987) have suggested that this integration allows the person to control the action through higher-level action descriptions. So, for example, someone who is practiced in impressing others can simply intend to make a good impression, and so will not need to identify all the components of this act separately and control them one by one (e.g., smile, shake hands, don't sweat, don't undress immediately, etc.). People who have not practiced a particular self-presentation will not benefit by such an integrative understanding, however, and may even be hurt by trying to control the overall impression they make. Their performance could be hurt by the *disruption* of automaticity by conscious control.

Several studies have tested this *optimal identification level* hypothesis. Experimental participants in such studies are given a self-presentational task that is easy or difficult for them; they are told that a person they are meeting is easy or difficult to impress (Vallacher, Wegner, McMahan, Cotter, & Larsen, 1992), or that an audience is easy or difficult to convince (Vallacher, Wegner, & Somoza, 1989). Ritts and Patterson (1996) manipulated such difficulty by testing socially anxious people (for whom self-presentation was assumed to be more difficult) and comparing them to the nonanxious. Participants are then given either big self-presentation tasks to perform (e.g., make a good impression), or small ones (e.g., remember to smile). The finding of these studies is that people who identify their act of control at the level appropriate for the difficulty of the task perform most successfully and feel best about their performance. So, when the task is easy and likely to be automatic, one can jump right in and try to "make a good impression." When the task is difficult and likely to require control of many details, however, it is better to focus on some one detail (e.g., smiling) and attempt to control that alone.

A different way to secure the control of expressive behavior is the creation of genuine change. Quite simply, if one's inner state changes in the appropriate way, expressive behavior can then issue directly from the expression of that state and will not need to be controlled. This is the approach of the method actor (Stanislavski, 1965; see also Hodges & Wegner, 1997). Of course, there are yet new dark rooms filled with stumbling blocks in the area of the mental control of inner states (Wegner, 1994), but the goal of effortless control of expressive behavior might often promote just such attempts at inner control. Wegner and Erber (1993) suggested that the control of internal states for self-presentational purposes in fact requires three varieties of mental control: the suppression of one's natural state of mind, concentration on one's preferred state of mind, and suppression of any performance-related states (e.g., anxiety, concerns about the success of control, etc.). This seems like a lot to remember. However, all this might come quite naturally with just the right mental control strategy. A good strong image of one's own death in a plane crash, for example, might motivate the perfect state of mind for the effective presentation to the flight attendant of one's desire for another alcoholic beverage. Appropriate concentration on the right state of mind seems to carry along with it an auxiliary ability to suppress the wrong state as well as the worries about one's state.

Tampering with inner states in the pursuit of self-presentation can be dangerous, however, as one is not likely to remember to put those inner states back the way one found them when the self-presentation gambit is no longer needed (Wegner & Wenzlaff, 1966) The person who tries to act tough and threatening in a job as prison guard, for example, may find that the self-generated anger bleeds over inappropriately into interactions with family and friends. Self-presentations erected for passing social pressures can stay in place when mental control is used to help them along, after all, and the result may be permanent inner changes that are not permanently desired (cf. Jones, 1990; Tice, 1994). And even on a short-term basis, self-presentational goals are like other goals in that they stay active following their intentional use and can thus operate for a time unintentionally, in a fashion similar to primed trait concepts (see Bargh & Green, 1997; Gollwitzer, Heckhausen, & Steller, 1990).

Another danger of the self-presentational control of both expressive behavior and inner states is that too much control can be exerted. With sufficient motivation, a person might try to quell every wrong behavior, and the result of this is a kind of general social paralysis (Greene, O'Hair, Cody, & Yen, 1985). At the extreme, control can also yield ironic effects, such that people find themselves performing the very expressive behaviors that are most unwanted (Wegner, 1994). Experimental participants who are highly motivated to deceive are often most inclined to "freeze" and leak nonverbal evidence of their deceit to observers in just this way (DePaulo, Lanier, & Davis, 1983).

Perceptions of Control and Automaticity In most domains of control and automaticity research, the issue of whether a behavior, thought, or emotion is controlled or automatic is pretty much a matter of what is going on inside the person. With expressive behavior, however, this concern becomes fully public and, in fact, a matter of greater importance to others. Perceivers become very curious about the actor's use of conscious control when they expect that they might be deceived. The question "does he love me or is this a line?" comes up in many guises. Control and automaticity are, in this sense, person perception problems.

It is important to remember, though, that conscious control of behavior does not on its face necessarily signify deceit, nor does automaticity imply genuineness. If conscious control leads a person to help someone in need, for example, who is to say that this act is not genuine? Similarly, if a person makes an unintentional and automatic error, does this mean that it says something genuine about the person's inner states or propensities? As a rule, the inference of deceit versus genuineness requires something beyond evidence on the control or automaticity of behavior per se: there must be the intention to deceive. Conscious control of behavior is deceptive when the control is intended to deceive others; automatic behavior is genuine, in turn, when it occurs in the context of conscious control that has been initiated in the intent to deceive.

Given this caveat, it is interesting to examine just how well the control and automaticity of expressive behaviors are discerned by perceivers. It turns out that when there is no intent to deceive, the discrimination of posed versus spontaneous expressive behavior is not very easy. Hess and Kleck (1994) found, for instance, that coders were generally poor at discriminating posed from spontaneous facial expressions. There are some cues, however, and the general trend seems to be for spontaneous movements to be more ambiguous and often less extreme than intended or controlled movements (e.g., Motley & Camden, 1988). Posed facial expressions tend also to differ from spontaneous ones in their timing, duration, and symmetry (Ekman, 1985). When deception is specifically intended, perceivers seem to be able to pick up on these cues and make fairly good judgments of whether the target is trying to deceive (DePaulo, 1992).

The literature on expressive behavior reminds us, in sum, of several key observations about control and automaticity that do not surface in the other literature on these concepts. This approach emphasizes that control and automaticity are not just different psychological processes but also can have different neuropsychological substrates. Looking at expressive behavior also illustrates the sheer difficulty of control in many social settings. And, this line

of inquiry leads to an appreciation of the fact that control and automaticity are not only functions within the person, but are themselves perceived and studied by others in the conduct of social interaction.

CONCLUSION

Are people in control of their behavior in interactions with other people, the opinions they form of those others, their emotional reactions to events of the day? To what extent are people aware of the important determinants of their judgments, emotions, and actions, such as the powerful effects of authority and conformity and the presence of others? These are questions that the classic studies in social psychology were designed to address. These are issues that lie at the heart of most social psychological phenomena we study today.

We have seen in this chapter that the classic studies highlight automatic forms of human responding. Like much of social psychology, these studies take the conscious control of behavior as a kind of backdrop, a taken-for-granted assumption that makes interesting news when it is shown to be in error. And in fact, this is a theme that has served social psychology well and no doubt will continue to do so as we march forward in our continued quest to test science against any and all sacred cows. As it turns out, however, this chapter has also revealed that the larger portion of mental processes, including those involved in social life, are characterized by mixtures, transformations, and relations between control and automaticity. We have attempted to classify the forms of these interactions, such as when a behavior is governed by a control versus an automatic process, and what consequences this has for the phenomenon in question. The field is learning, as have we, that there is a fundamental interplay between these processes in social life. The mere observation that people don't have control here or don't have control there may no longer be sufficient to create "classic" social psychological investigation.

We have also emphasized that control and automaticity both can be described broadly in terms of control theories. That is, both kinds of processes operate in the service of the individual's goals and purposes. Automatic processes furnish a massive amount of information to control judgment and decision processes, more efficiently than would be possible with the slower and energy-demanding control processes alone. They transform complex patterns of stimulation and produce simplifying categorizations on which the slower and more limited control processes can then operate. Conscious control processes can then consider this input in a flexible and creative fashion should that serve the current purpose of the person—such as when it matters to be accurate and complete in one's opinion or decision. Moreover, the control process is capable of regulating the habitual or automatic process, again given the motivational impetus to exert this control.

We have also discovered, in our reviews of the classic and contemporary research in the field, that control and automatic processing are not merely interesting topics for cognitive psychologists to research. They parlay into very serious consequences for a person's phenomenal experience (such as to the degree to which one has control over one's emotions) and for one's relations with others (such as whether one's opinions and treatment of them is biased). They relate to the way in which attitudes form and change, to the way in which inner states are expressed to others, and by implication, to one's degree of free will in obeying authority, conforming to others, and reacting to people in need of help.

The distinction between control and automatic mental processes is of critical importance in social psychology precisely because it is the dividing line between what we purport to know about ourselves and what we do not. While the classic experiments in our field have shown us to be largely ignorant of the powerful effects that authority figures and majority opinion have on our behavior, at the same time they demonstrate our rather automatic ability to get along with others and function smoothly in a social organization, instead of as individuals acting in the service of our separate goals. Automatic processes constitute a broad undercurrent of life that keeps us connected to the world and behaving effectively on many planes in response to a welter of environmental and internal stimulation. Yet at the same time a thin thread of conscious control organizes these automatic processes and relates them to our goals and concerns. The moment-to-moment interaction between control and automatic processes is therefore the place where human goals and mental processes meet, and where the daily tasks of survival become infused with larger purposes and direction.

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