

Environmental Control of Goal-directed Action: Automatic and Strategic Contingencies between Situations and Behavior

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My thinking is first and last and always for the sake of my doing.

—William James

All thought paralyzes action.

—Jean Cocteau

What is the relation between thought and action? Does thought exist in the service of action, as James (1890) contended? Or is the realm of thought somewhat separate from that of action, as implied by Cocteau—not to mention the experimental psychologists of his era, who considered thought to be epiphenomenal to responses to the environment (e.g., Guthrie, 1952; Skinner, 1953; Spence, 1950).

Our aim in this chapter is to address the links between environmental events and the actional responses to them. We focus on the issue of whether there is direct environmental control over behavior, in the form of behavioral responses automatically triggered by features of the current situation in which one finds oneself. We focus also on the mediating role of thought or cognition in this process and

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argue that a certain form of thought—termed *implementation intentions*—has a unique role in the environment-to-action sequence.

We argue that goal-directed action can be triggered directly by environmental stimuli, without the need for conscious involvement. Given a specific set of situational features, an individual may behave in ways he or she did not consciously choose or intend or may not be aware of the reasons for that behavior at the time.

The critical phrase in the above description is “at the time,” because, as we will show, these direct environment-action links are dependent on intentions developed in the past. There are two basic types of environmental control. One form results from the repeated satisfaction of an enduring goal in a certain situation by certain behaviors. We propose that chronic situation-to-goal links develop from the frequent and consistent pairing of the features of a situation with goal-directed behaviors. That is, the individual chronically has the same goal in that situation so that the association between the mental representation of that situation and the representation of the respective goal-directed behaviors eventually becomes automatized. This principle, derived from the auto-motive model of environmentally directed behavior (Bargh, 1990), will be discussed in the first part of this chapter.

There is another route to direct control of action by the environment via the formation of specific implementation intentions (e.g., Gollwitzer, 1990, 1993). This route is strategically employed by the individual to attain desired goals in circumstances in which the person anticipates difficulty in attaining desired ends and so intentionally turns to environmental control to further goal achievement. Implementation intentions, in effect, create a contingency between a future (usually the short-term or immediate future) set of circumstances and the behavior one has decided to enact when those circumstances occur.

For instance, one may have to pick up one's daughter from kindergarten earlier than usual one afternoon. To make sure one remembers to do so, an implementation intention can be made that morning, such as “when my office clock strikes 3, I will leave the office for the kindergarten immediately.” Note that this implementation intention is different from the goal intention to pick up one's daughter from school—it specifies the precise environmental circumstances or cues that provoke the desired behavior. Note also

that this strategic use of environmental contingencies by implementation intentions would not have been necessary if the parent had to pick up his or her daughter from school at the usual time (say, at 4:30). In that case, the parent could have relied on the auto-motive or habitual control of the goal intention to pick up the daughter from kindergarten.

These two ways in which environmental control over goal-directed action can occur are each mixtures of the intentional and the unintentional, of the automatic and the controlled. It may seem paradoxical that a habitually automatic process could be intentional, in a sense, because a defining feature of automatic processes is their unintended nature (see Bargh, 1989; Shiffrin & Schneider, 1977). Yet a hallmark of learned, habitual, automatic processing abilities such as skills (e.g., driving, typing) is that they were once effortful and intentional and only slowly, with considerable experience, become efficient and reflexive (see Miller et al., 1960; Newell & Rosenbloom, 1981). In the same way, the auto-motive control of behavior originates in intended, consciously chosen behavioral responses that only become habitual after frequent and consistent employment.

In the case of the strategic route to environmental control, the resultant behavior is much more clearly intentional. After all, the strategic form is the result of a single mental act—the formation of an implementation intention (i.e., “I intend to perform behavior X when situation Y occurs.”). However, this behavior is also automatic, because at the time of behaving, the effect of the triggering environmental features is direct and immediate and requires no intervening conscious choice, intention, or awareness at that time.

There are parallels to this model in the impression-formation, attitudes, and self-perception research literatures, all of which contain evidence of a direct, autonomous effect of the environment that can occur via either chronic or temporary means. There has been considerable research into the notion of trait-construct accessibility as an important determinant of social perception (e.g., Bruner, 1957; Higgins, 1989; Higgins & King, 1981; Wyer & Srull, 1989). Specifically, people's behaviors are said to be categorized or interpreted in terms of trait concepts (e.g., “That is an honest thing to do”; “She is being too pushy”) relevant to the behaviors.

One factor in determining how a behavior is understood—especially considering the general ambiguity of social behavior (in that

any given act can be understood in several ways; see Bruner, 1958)—is the relative accessibilities of the various trait constructs relevant to that behavior. In other words, a person (say, a suspicious person) can be mentally more ready to understand a behavior in terms of manipulateness than in terms of friendliness (e.g., "He just wants me to do a favor for him in return someday."). How "perceptually ready" (Bruner, 1957) a person is to understand a behavior in terms of one relevant concept over another is a function of many factors, such as the person's goals, but the factors we focus on here are how recently and how frequently the concept has been used in the past.

An individual chronically invokes a certain limited set of trait constructs in understanding behavior, and there are wide individual differences in the particular constructs a person uses chronically (Higgins et al., 1982). For present purposes, what is important is that these frequently used constructs become capable of automatic activation by the presence of relevant behavior in the environment. Trait terms related to one's self-relevant or other-relevant chronic constructs, compared with one's nonchronically used constructs, become active without an individual's awareness given the presence of relevant stimuli (Bargh, 1982), when attention is overloaded and in short supply (Bargh & Thein, 1985; Bargh & Tota, 1988), and even when one is trying to ignore such trait terms as irrelevant to one's task (Bargh & Pratto, 1986). Thus, these chronically employed mental representations of types of social behavior exhibit all four defining features of automatic, environmentally triggered cognition (see Bargh, 1989, 1994): they become active on the mere presence of the relevant environmental event, with no need for an individual's awareness of that event, without the individual intending to think about the event in that way, when conscious attention is devoted elsewhere at the time, and even when the person is trying to ignore or prevent the activation.

Such automatic activation of mental constructs can also occur when the construct is made accessible temporarily through recent, deliberate conscious use. Higgins et al. (1977) were the first to demonstrate such "priming" effects in the context of social judgment. Subjects believed they were participating in two unrelated experiments. In the first experiment they were exposed to trait words as part of a "memory test," and in the second they read about a target person's behavior. The behaviors were ambiguously relevant to the

traits primed by the first task, and the results showed that subjects were more likely to interpret or categorize the target person's behavior in terms of the primed trait than in terms of the unprimed alternative trait. For example, subjects' opinion of a person who sailed across the Atlantic Ocean by himself was more positive if they had been presented earlier with "adventurous" traits in the memory experiment than if they had seen "reckless" traits instead.

Higgins et al. (1977) took great care to ensure that subjects had no awareness of the relation between the two tasks, as did subsequent contextual priming experiments. The first task, in which subjects are unobtrusively exposed to the critical priming stimuli, is usually some kind of simple mental task, such as memorizing words, naming their color, or making sentences out of them. Thus, the priming task is designed to have nothing in common with the second task, so there is no carryover of the goal or processing strategies of the first task to the second. This design also ensures that subjects do not become aware of how the first task might have affected their responses on the second task, nor are the results on the second task attributable to priming effects. Numerous experiments with this basic paradigm have confirmed that subjects are not aware of or intend this interpretational influence of temporarily accessible trait constructs (e.g., Bargh & Pietromonaco, 1982; Srull & Wyer, 1979).

Thus, just like chronically accessible trait constructs, primed or temporarily accessible constructs exert their influence automatically, without the perceiver's awareness or intent. Moreover, it has been demonstrated that these chronic and temporary forms of accessibility behave similarly within the same experiment (Bargh et al., 1986, 1988), both causing more extreme trait ratings of ambiguously relevant behaviors. In fact, in line with the theoretical notion that chronic and temporary construct accessibility are manifestations of the same underlying mechanism (i.e., amount of construct activation; see Higgins et al., 1985), Bargh et al. (1986) found that the two sources of accessibility combined additively.

The construct-accessibility results are consistent with the present conceptualization because they show that automatic activation of mental representations by relevant environmental events can occur through both the chronic and the temporary readiness of that construct to become active. But evidence of these two varieties of automaticity in social perception and cognition is not limited to trait-

construct activation. Racial and gender stereotypes, attitudes, and self-concepts are among the social knowledge structures that have been shown to have characteristics of automatic activation by environmental features (see reviews by Bargh, 1989, 1994). One set of research demonstrates automatic activation of mental representations in the mere presence of the relevant object or event in the environment (e.g., stereotype activation given the corresponding physical features of the stereotyped group; see Devine, 1989), while the other form has the additional necessary condition of recent conscious activation (i.e., priming) of the representation for the effect to occur (e.g., recently expressing one's attitude increases its subsequent influence over behavior toward the attitude object; see Fazio et al., 1982).

To summarize, we argue in this chapter that direct control over behavior by the environment can and does occur. This delegation of control to the environment can either develop out of the repeated, chronic pursuit of the same goal in the given situation or be caused by a strategic creation of an environment-action contingency. In either case, behavior is triggered automatically—immediately, reflexively, efficiently, and without the interpolation of a conscious choice or decision—at the occurrence of the relevant environmental event.

Automatic Behavior through Auto-motive Control

Langer (1978) first raised the possibility that social behavior may not always be based on conscious deliberation and choice but instead could be a "mindless" reaction to situational features. This hypothesis was derived from script theory (e.g., Abelson, 1976), which posits that people develop representations of frequently experienced social interaction situations that generate expectations for what will happen in that routine situation. These expectations can become so strong with experience that one may react as if the expected feature were there when in fact it was not (see Langer et al., 1978).

It is an often-observed characteristic of knowledge structures, such as scripts, person prototypes (Cantor & Mischel, 1977, 1979), schemata (Markus, 1977; Spiro, 1977), and stereotypes (Hamilton, 1981; Pratto & Bargh, 1991), that one fills in missing features of an ex-

perience, allowing expectations or predictions about nonpresent elements to be made in default of relevant individuating information (Fiske & Neuberg, 1990). Often, as in the case of racial or gender stereotypes, people may then react as though the expected feature was really present (Neuberg, 1988; Snyder & Swann, 1978), sometimes eliciting the expected behavior as a self-fulfilling prophecy (e.g., Jussim, 1986; Rosenthal & Jacobson, 1968).

In a study most directly relevant to our hypotheses, Carver et al. (1983) proposed that priming effects on impression formation might also explain modeling effects, in which witnessing the behavior of another individual makes one more likely to engage in that behavior oneself. Carver et al. (1983) hypothesized that there would probably be associations between the information in memory as to how to perceive or recognize a given kind of behavior (e.g., aggressiveness) and the information in memory that enables us to act aggressively ourselves. Thus, priming of the perceptual representation as in impression-formation studies may also result in heightened activation of the behavioral-production representation, because of the semantic relatedness of the two sets of information. Carver et al. (1983) showed that the same hostile-priming manipulation (from Srull & Wyer, 1979) caused subjects both to rate a target person who behaved in an ambiguously hostile way as more hostile than did control subjects (Experiment 1 in Carver et al., 1983) and to administer electric shocks of greater intensity to another subject (in reality a confederate who was not actually shocked) in a learning experiment (Experiment 2 in Carver et al., 1983).

By arguing that contextual priming could have behavioral consequences, Carver et al. (1983) were the first to predict that behavior can be influenced by situational features outside awareness and without intention. However, there is an important theoretical difference between the present model and that put forward by Carver et al. (1983). We hypothesize that enduring goals or motives become activated directly by the environment, whereas Carver et al. (1983) posit a more cognitive, informational basis for the effect. We will return later to a comparison and several experimental tests of the motivational versus cognitive explanations.

There is also an important methodological difference between the Carver et al. (1983) study and our own: in their Experiment 2, subjects were instructed to (i.e., given the goal to) shock the other

subject, and the hostile priming served to augment the conscious, intentional goal-directed behavior. In our experiments, on the other hand, we did not give subjects an explicit conscious goal but rather sought to activate those goals without subjects' awareness or intention and then to see the effect of those automatic goals on behavior.

There is precedence in these various findings, therefore, for the idea that situational features can activate mental representations corresponding to them and that these representations can then serve as the informational basis for further behavior in that situation (e.g., toward a stereotyped individual, such as waiting for a yet-unseen waiter to bring the menus in a restaurant). The central tenet of the auto-motive model (Bargh, 1990) is similar, except that it posits that latent enduring goals or motives are directly activated by situational features, not only informational knowledge structures. That is, previous work on the behavior-mediating quality of mental representations assumes that these representations serve as a supplemental knowledge base, with intentional, consciously made decisions about how to behave toward the other person or in that situation then made on the basis of this internal source of information. The process of automatic activation of one's enduring goals, on the other hand, bypasses the conscious choice stage entirely—it is these choices or goals themselves that are said to be automatically activated by the environment, according to the auto-motive model.

This feature of the model is critical for the proposal of direct environmental control over behavior. By "direct," we mean without the necessity of conscious, intentional intervention between the occurrence of the triggering environmental features and the engagement of the automated behavioral response. It is assumed that the habitual serving of a goal within a given situation not only connects the goal with the situation but also those goal-directed behaviors that have been effective in satisfying the goal in the past. Of course, any given goal can be reached by different lines of action, some of these being more effective than others and thus more readily used. This implies that the activation of the goal spreads to various goal-directed courses of action, with those most successful in the past being more strongly activated and thereby more likely to be employed in the present situation. This part of the model is reminiscent of Hull's (e.g., 1943, 1952) notion of response hierarchies.

What kind of goal striving can become habitualized? Habitualiz-

ation of goal attainment requires frequent and consistent serving of this goal in the same situational context (e.g., Shiffrin & Schneider, 1977), which implies that the person must feel committed to this particular goal over time; for example, being a good mother, a high achiever, or a moral person (see Cantor & Kihlstrom, 1987; Emmons, 1989; Gollwitzer & Wicklund, 1985). We distinguish this type of goal, which cannot be reached by a single act or on a single occasion, from those that can—a distinction captured, for example, by the difference between wanting to affiliate and wanting to be affiliative. It is this latter type of goal that we mean when we refer to "enduring goals." Motives are similar to enduring goals, as they describe a class of incentives (e.g., power-related incentives) that a person finds particularly attractive and, therefore, chronically strives for (McClelland, 1953, 1985).

THE CASE AGAINST AUTOMATIC (ENVIRONMENTALLY DIRECTED) BEHAVIOR

The theoretical heritage of the auto-motive model is seen in the considerable evidence of preconscious processing of social information that has been gathered over the past 15 yr (see reviews in Bargh, 1989, 1994). This form of automatic processing requires only the presence of the relevant social stimulus object or event—person, type of behavior, situational setting—to occur; no intention that it occur or awareness of the process, or devotion of conscious attentional resources, is necessary. Thus, given the presence of a female job applicant, for example, the personnel manager's stereotypic conception of women will become active without the manager's intention or awareness and will possibly influence the hiring decision. In another example, a person with chronically accessible mental constructs for rudeness and intelligence will pick up those features of people (if they are present) at a busy cocktail party and possibly not much else. However, the operation of these preconscious processes was found to be limited to the selection and interpretation of social information and not to extend to the making of judgments and decisions themselves (see Bargh, 1989; Higgins & Bargh, 1987). Impressions, for example, were not formed unless the perceiver had the goal or intention of forming one and the attentional resources

(i.e., no distractions or concurrent demands on conscious attention) to do so (see Bargh & Thein, 1985; Bassili & Smith, 1986).

Second, a legion of motivational influences on the judgment process have been found that enable a person to overcome or override these automatic input effects. Making a person feel more accountable for his or her judgment (in that the subject believes he or she will later have to justify the reasons for it to others; see Tetlock, 1985), having one's outcomes dependent on the other person about whom one is forming an impression (creating a pragmatic need to be more accurate; see Erber & Fiske, 1984), and possessing strong values, such as not to be prejudiced (Devine, 1989), have all been shown capable of attenuating if not eliminating preconscious influences. Of course, the individual has to be aware of the influence or at least the potential for being influenced for the motivational correction to occur (see Bargh, 1992), but it is not uncommon for a person to feel that he or she may have been influenced (e.g., by gender or skin color) without actually being aware of the (automatic) influence itself.

With these two research conclusions—that social judgments and decisions are not made automatically but only when the individual has the goal of making them and that goals or motivations are capable of overriding automatic input analyses—it seemed clear that a person's current goal determined responses to the environment. To the extent that these goals or intentions were generated or put into play by conscious processes, direct environmental control over behavior (through behavioral choices or decisions) would not be a possibility.

THE CASE FOR AUTOMATIC BEHAVIOR

However, the fact that such mental representations as stereotypes and chronically accessible trait constructs had been shown to be directly activated by the environment meant that it was possible for other forms of representations to develop such automatic links to the environment. The content or purpose of the representation should not matter, so long as the same conditions needed to produce the automatic association held. Those conditions are the same as for the development of any mental association, the (literally) an-

cient principles of how two ideas become associated with each other in memory: through frequent and consistent pairing of the two mental representations caused by their being active in memory at the same time (see historical review by Anderson & Bower, 1973; see also James, 1890; Hebb, 1948; Schneider & Fisk, 1982; Shiffrin & Schneider, 1977). In the case of automatic activation of racial or gender stereotypes, certain physical features are frequently and consistently paired with representations of beliefs and traits; in the case of automatic activation of attitudes (see Bargh et al., 1992; Fazio et al., 1986), the representation of the attitude object is paired with its evaluation as good or bad. Eventually, this associative link becomes "unitized" (Hayes-Roth, 1977) or "compiled" (Anderson, 1983) such that the mere presence of the physical features of the person or object in the environment is sufficient to activate the stereotype or attitude because there is an automatic link between the relevant sensory feature representations and the person-type or object category and now an automatic link between the person or object category and the stereotypic or evaluative features.

Once such theoretical groundwork is laid, it becomes a relatively trivial matter to advance the proposition that enduring goals or motives should be capable of developing automatic associative links to environmental features in the same way. Certainly goals are represented in memory just as are stereotypes and attitudes and chronically accessible trait constructs. Indeed, there is good evidence that we represent others' behavior in terms of their goals and purposes and form impressions of them on the basis of their perceived goals (see Brewer & Dupree, 1983; Read et al., 1990; Trzebinski, 1985). What then should occur if a person pursues the same goal over time within a given situation? The mental representation of that particular set of situational features (e.g., of a party, an office meeting, a church service) will be repeatedly and consistently activated in memory at the same time that specific goal representation is active. By the associative principle of contiguous activation (Hebb, 1948), therefore, automatic links should develop between representations of social situations and those of goals the individual chronically pursues within them: this hypothesis is the core premise of the auto-motive model.

From this initial premise that these enduring goals will become

activated automatically when the individual enters into the relevant situation (i.e., in the mere presence of the triggering situational features), several hypotheses follow. The first of these is that the automatically activated goals will then guide behavior within the situation, without the individual choosing or intending that particular line of action. The issue of volition is a tricky one here, and it is important to be precise. In one sense, as we argued earlier, this behavior is intentional in that it was repeatedly and deliberately selected in the past. Eventually, we postulate, this selection or choice becomes just another routine and invariant feature of the situation to the mental system, and is thus bypassed. The same principle of routinization can be found in models of skill acquisition (Anderson, 1987; Fitts & Posner, 1967; Newell & Rosenbloom, 1981), proceduralization of knowledge (Anderson, 1983, 1992), and script operation (Abelson, 1981). Therefore, it would be appropriate to say that automatic behavior due to the operation of enduring goals or motives is unintentional at the time but intentional in the sense that the choice of the behavior was made in the past, not in the present.

Because the goal that guides behavior is activated automatically and operates without the need for conscious attention or guidance, we can further hypothesize that a person will have no phenomenal experience of choosing that line of behavior or any consequent memory for the reasons or factors that entered into that choice. Accordingly, the person may misattribute the reasons for his or her behavior to causes that seem reasonable or logical on the basis of his or her theories of what must have caused the behavior (see Nisbett & Wilson, 1977).

Thus, if the hypothesis of direct environmental control over behavior is valid, we should be able experimentally to activate situational goals without the subject's awareness or intention and then observe both goal-directed behavior by the subject and evidence that he or she was not aware of the cause of the behavior. We now turn to several recent experiments testing these hypotheses.

The Priming of Goal-directed Behavior

THE INTERRUPTION STUDY

Can goals become activated without intention or awareness to then guide behavior? In our first experiment, we tested this possibility using the same priming methodology that has been employed in impression-formation research. In those studies, certain trait constructs are activated unobtrusively in one setting and are found to exert an influence over impression formation—specifically, the interpretation of relevant behavioral information—in what subjects believe to be a totally unrelated second study.

We (Bargh et al., 1993a, Experiment 1) placed subjects in a goal-conflict situation, after first priming one or the other (or neither) goal using the scrambled-sentence technique (see Srull & Wyer, 1979). Subjects were informed that they would be participating in two short "mini-experiments." They were shown into a room and told that the first study had to do with language ability and were then given the scrambled-sentence test to complete. There were 20 items, each of which consisted of five words in a "scrambled" order (e.g., "worked the clown hard laughed"). For each item, subjects were to write down a grammatically correct four-word sentence (e.g., "The clown laughed hard.") as quickly as they could. After they finished this task, they were to leave the room and go down the corridor to find the experimenter, who would be preparing the second experiment for them.

The three versions of the scrambled-sentence tests were identical except for eight words interspersed across the 20 items. These words were all either related to the goal of assertive behavior, polite behavior, or neither (in the control condition). In this way, we intended to activate the goal of assertiveness or politeness (or neither one) in subjects before their entry into the goal-conflict situation that followed.

After finishing the priming task, subjects went down the hall and around a corner, where they saw the experimenter standing in a doorway about 30 ft away. The experimenter was talking to another subject (who was actually a confederate) seated in that room. The actual subject, coming down the hall, could only see the experimenter and could hear but not see the confederate. When the experimenter

saw the subject come around the corner, he made a signal to the confederate, who started a stopwatch.

The goal-conflict situation was created by having the confederate continually asking questions of the experimenter, not understanding much of what she was supposed to do, and generally keeping the experimenter continuously occupied by her questions. The experimenter had his attention focused on the confederate and did not break off and look at the subject after he or she had arrived. The subject knew that the second part of the experiment was to be brief, and if he or she could just get started on it, the experiment would be completed and they could leave. But the experimenter and confederate kept up their conversation, forcing the subject to interrupt the experimenter if he or she wished to proceed with the second experiment. Our dependent measure was simply the number of seconds that passed before the subject attempted to interrupt the experimenter.

The subject was thus put in a situation in which he or she wanted to interrupt but also wanted to be patient and polite (a goal generated from the social norm for the situation; see Bargh, 1990) and thus not interrupt while the experimenter was answering the questions of the hapless "preceding subject." Which path would subjects take? The power of our goal-priming manipulation was striking: those subjects primed for the goal of acting assertively interrupted the experimenter after about 5.5 min of waiting. Subjects in the "polite" goal-priming condition, on the other hand, did not interrupt until after waiting more than 9 min. The mean for the neutral-priming condition was between the two goal-priming condition means and closer to the polite than to the assertive mean.

The considerable difference in time-to-interrupt between the assertive and the polite conditions could well have been even greater, had we not placed a 10-min (600-s) limit on making the subject wait for the next part of the experiment. Given this self-imposed ceiling on the dependent measure, we evaluated the data in terms of the percentage of subjects in each condition who did interrupt during the experimenter-confederate conversation. Less than 20% of the subjects in the polite condition interrupted at all, compared with nearly 40% in the neutral condition. However, over 60% of the subjects in the assertive condition interrupted the experimenter to get the materials for the second mini-experiment.

These results strongly support our hypothesis that goals could be activated by situational features so that this goal would then direct behavior in a subsequent goal-relevant situation, without the subject consciously choosing or intending the behavior. This result constitutes a priming effect on behavior in the absence of an experimentally supplied goal to the subject to behave in that way (cf. Carver et al., 1983). The priming manipulation was an experimental simulation of situational features that would directly activate those goals and the respective associated behaviors of being assertive or polite.

THE ACHIEVEMENT-VERSUS-AFFILIATION STUDIES

In our second experiment, we sought to replicate this goal-priming phenomenon in a different goal-conflict situation based on a common classroom experience. Often a student knows the answer to a teacher's question and raises his or her hand to answer it. Doing this too often, however, runs the risk of incurring the ostracism of one's classmates, who think they are being shown up by a know-it-all. This is a classic goal-conflict situation: one wishes to achieve and perform well academically in class, but one also wants to have friends and be well liked by classmates. Pursuing one of these goals is often done at the expense of the other.

In our second and third experiments (Bargh et al., 1993a) we created such an achievement-versus-affiliation conflict by having the subject work as a team with another subject (who was actually a confederate) on a series of word-search puzzles, 11 × 11 matrices of letters in which words relating to a common theme (e.g., bugs, colors, fruits), presented above each puzzle, were embedded. The "teams" were to work together to find as many words as possible within the 3 minutes allocated for each puzzle.

Before working on these puzzles with their teammates, subjects had completed a "practice" version by themselves. This practice puzzle constituted the priming task. A list of words to be found in the puzzle was presented at the bottom of the page. These words were related to achievement (e.g., "achieve," "succeed") or affiliation (e.g., "friendship," "support") or were neutral words (e.g., "turtle," "lamp").

In the experimental situation, the confederate performed poorly by design on the word-search task, having evident trouble with it and becoming more and more withdrawn from the task over the five trials. He or she became somewhat frustrated and a little embarrassed at his or her lack of ability. (The confederate on the average circled one word for every three found by the subject.) By finding a lot of words, the subject would thus fulfill the achievement goal but would also be making the confederate feel worse about himself or herself (and perhaps resentful toward the subject); by "dumbing down" and not getting as many words as he or she could, the subject would help to minimize the difference in the numbers of words circled between them (each used pens with different colors, so this discrepancy was salient) and so pursue the affiliation goal by performing at a more similar level to that of the confederate and preventing the confederate from feeling too bad.

Again, we obtained a sizable difference in performance on the word-search task as a function of which goal had been primed. Achievement-primed subjects found significantly more words on the first two word-search puzzles than did subjects in the affiliation- or neutral-priming conditions. All three groups performed similarly on the final three puzzles. The finding of priming effects early on that dissipate over time is consistent with several studies in the trait-construct-priming literature, which show such priming effects to decrease over time (e.g., Bargh et al., 1988; Higgins et al., 1985). More relevant is the finding by Wilson and Capitman (1982) that reading a "boy-meets-girl story" made male subjects subsequently more friendly toward a female confederate they met immediately after reading the story but had no effect when there was a 4-min delay before meeting the confederate.

It is not just the decay of goal activation over time that could result in an attenuation of the priming effect on the later trials, however, but also the power of the situation itself. It is clear from the neutral-priming results in the early trials that the power of the affiliation features of the situation (i.e., the confederate's withdrawal) was stronger than that of the achievement features in determining behavior. Since priming manipulations are meant to activate one or another goal relevant to the experimental situation but in an unrelated context prior to the subject entering that situation, it is not surpris-

ing that the features of the actual situation in which our subjects subsequently found themselves could activate a different goal later on.

An unanticipated aspect of our results was that, although the priming effect for the first two trials was reliable overall, the effect was much stronger for male than for female subjects. Since we replicated this sex difference in the next experiment, we save discussion of it until those results are presented.

INDIVIDUAL DIFFERENCES IN THE CHRONIC ACTIVATION OF ENDURING GOALS

As noted earlier, just like a social trait construct, a given goal can be activated both contextually and chronically. Thus far we have used temporary activation as a proxy for the effects assumed to occur in the case of one's chronic goals. That is, the priming manipulations have served temporarily to create increased activation of a competing goal. People are presumed to differ, however, in the level of chronic activation of these goals. In our third experiment, we replicate the achievement-versus-affiliation study procedure, but with the addition of measures of chronic achievement and affiliation motives.

On the basis of related work in social construct accessibility research, we predicted that the primed goal would determine behavior for the early trials of the word-search puzzle but that over time this temporary influence would recede and the subject's long-term chronic goal activation would again dominate. Higgins et al. (1985) and Lombardi et al. (1987) both found that the more recently primed trait construct determined impressions for a short time, but thereafter the more frequently primed construct won out. Bargh et al. (1988) obtained the same effect when chronically accessible trait constructs (assumed to be the most commonly used over time by the subject) were substituted for frequently primed constructs.

We measured subjects' achievement motive using a single picture from the Thematic Apperception Test (TAT; Murray, 1943)—a silhouette of a young man stepping up to and looking out an opened window (Picture 6 of the TAT)—to which subjects answered questions as to what they thought was going on in the picture. The TAT has served as the classic, standard measure of the strength of the

achievement motive for many years (see Atkinson, 1958; Heckhausen, 1990) and can be considered a good measure of an enduring goal or motive (see Sorrentino & Higgins, 1986). In telling their stories about the picture, subjects responded to a structured series of questions, such as "What is happening?," "What led up to the situation?," "What is wanted?," and "What will happen?" Responses to these questions were coded by two independent judges using Heckhausen's (1990) scoring system, which consists of 13 categories relating to achievement and failure themes. Interjudge reliability on overall achievement motive scores was high.

The affiliation motive was measured by the affiliation subscale of the Personality Research Form (PRF, Jackson, 1984). All students in New York University's introductory psychology course had completed the TAT and PRF measures (among many others) as part of a mass testing session earlier in the semester. On the basis of their achievement and affiliation scores, two groups of subjects were selected for our third experiment—those with high achievement and low affiliation scores and those with low achievement and high affiliation scores. The experimental procedure was the same as for our Experiment 2 described above.

The results again showed a reliable priming effect for the early but not the later trials and only for male subjects. Achievement-primed male subjects outperformed affiliation-primed subjects by a wide margin—more than 1 SD. Most important, just as in the social construct accessibility studies, this priming effect was eventually overridden by a significant chronic goal effect. The primed goal determined performance early on but by the last trial was overtaken by a reliable chronic goal effect. That our priming manipulation interacted with chronic goals (demonstrating a shared underlying mechanism), just as primed trait constructs interact with chronic constructs over time in impression-formation studies, is additional evidence that we are successfully priming goals and not behavioral schemata or perceptual constructs.

Why did these effects occur precisely as predicted for males but not at all for females? It is important to note that females did not differ from males on the achievement motive, as measured by the TAT; the means and ranges for the male and female subjects in our experiments were nearly identical. Thus, one issue is why this achieve-

ment-motive measure did not predict achievement on the later trials for women as it did for men.

There are several possible explanations. First, the achievement-motivation literature has historically obtained effects only for males and not for females (see Horner, 1974)—to the point that data for females were not collected, and, when available, were not even analyzed (e.g., Reuman et al., 1984). In one sense then, the similar sex differences that we found in both the chronic and the primed effects—which were both reliable for men, but not for women—can be seen as additional evidence that our priming manipulation is activating goals. No such sex difference in trait-construct-priming effects has been reported in the impression-formation literature.

The reason for the sex difference would seem to have something to do with the different ways that men and women express their achievement goals—men do so more in competitive performance situations, and women more in social situations (Higgins, 1991). In retrospect, it may be that the achievement-goal-primed and chronic-achievement-goal female subjects expressed their achievement orientation by attending to the social demands of the situation (i.e., the confederate's unhappiness and withdrawal)—just as did the affiliation-goal-primed and chronic-affiliation-goal female subjects, resulting in the same effects on task performance but for different reasons.

Another explanation might be that automatic behavior effects occur only for men and not for women. There were no such sex differences in our first experiment (the "interruption study"), that primed being assertive or polite, however, so we do not believe this factor explains our results. In any event, we moved away from the achievement-versus-affiliation goal-conflict scenario in Experiment 4 partly to ensure that there were no sex differences in automatic goal activation effects in general, as well as to help differentiate between two competing explanations of our effects each of which could account for the results of all three experiments so far.

Activated Goals versus Activated Schemata

As mentioned earlier, Carver et al. (1983) proposed that priming effects on perceptual structures may spread to semantically related be-

havior production structures and thereby influence subsequent behavior. According to this account, trait priming has the simultaneous effect of activating a perceptual structure with which to interpret the behavior of others and a behavioral structure with which to engage in that behavior oneself. With some additional assumptions, their model (which we call the *behavioral schema model*) could account for the results of our first three experiments.

In this alternative interpretation, our priming actually activates and makes more accessible a behavior knowledge structure that is relevant to the subsequent situation: assertiveness or politeness, achievement or affiliation. When in that situation, the subject consciously chooses how to behave. This conscious choice is influenced by the relative accessibilities of the various behavior schemata available in memory; the priming thus has the effect of swaying the conscious choice of behavior to one type over another. As well as being able to account for our experimental evidence thus far, this model has the apparent advantage of parsimony: the same activated behavioral schema accounts for priming effects in both impression formation and behavior.

Our account, however, is different. We predict that enduring goals or motives are *directly* triggered by the environment without any intervening conscious choice among alternatives. Second, we predict that this direct activation of goals will result in a *motivational state*, with qualities that distinguish it from a purely cognitive phenomenon.

In the following experiment, we sought to distinguish between motivational and cognitive explanations for our automatic behavior effects. One approach to doing so would be to test for the presence of goal-striving behaviors as a result of our goal-priming manipulation. Goal pursuit has properties, such as persistence and energization, that are not predicted by the behavioral schema model (see Atkinson & Birch, 1970; Heckhausen, 1990; Kuhl, 1986; Lewin, 1951; Pervin, 1989; Wicklund & Gollwitzer, 1982). An individual will persist or strive for the desired goal in the face of obstacles, and return to the goal task after being interrupted, until a sense of completion is obtained; the mental goal representation will continue to be activated during this pursuit even when conscious thoughts have been taken up with other matters (Atkinson & Birch, 1970; see also Martin & Tesser, 1989). This phenomenon is also illustrated by the "incuba-

tion" effect (e.g., Norman & Bobrow, 1976), in which a sought-for answer to a question, or something one was trying hard to remember but could not, pops into the mind out of the blue, long after one has stopped (consciously) thinking about it and gone on to other matters.

THE PERSISTENCE STUDY

Our fourth experiment tested whether subjects will persist on a task longer as a function of goal priming, a quality associated with an active goal and one on which the behavioral schema model is silent. In other words, will subjects persevere longer on a task if the goal of achieving has been activated automatically through a priming manipulation? Moreover, we designed the study such that the primed goal, persistence on the task, would be in the opposite direction to the experimental instructions (the conscious goal), which was to stop as soon as the experimenter directed.

Subjects participated three at a time but were partitioned from each other's view. They were informed that the experiment had to do with language skills. In the first task (which constituted the priming manipulation), subjects either completed the achievement or the neutral word-search puzzle from our Experiment 2 (resulting in achievement-primed and neutral-primed conditions). Then, they were given a rack of eight Scrabble letter tiles (three vowels and five consonants) and instructed to find as many different words as they could using the letters in 2 min. The experimenter told the subjects that she had to go get another experiment ready down the hall and that, if she could not return in time, she would give the signal to stop over the intercom in the front of the room. She then told the subjects to begin and left the room.

Unknown to the subjects, a videocamera was hidden in a box at the front of the room, and their behavior was monitored. After 2 min the experimenter gave the stop command and then measured how long subjects continued to work on the task in her absence (and out of view of the other subjects). Again the results showed a powerful effect of the priming manipulation on the dependent variable of task persistence. Over 50% of the subjects in the achievement priming condition—more than twice as many as in the neutral priming con-

dition—continued to work after the signal to stop. Whereas the effect was again stronger for males, it was nonetheless reliable and quite strong for females as well, indicating that automatic goal activation occurs for both sexes.¹

Note also that the primed goal caused behavior in the direction opposite the instructions given to subjects by the experimenter (i.e., to stop when they heard the signal). This result is another demonstration of an automatic effect on behavior that is not an enhancement of behavior in line with an experimentally supplied task goal.

The results of this study demonstrate that our priming manipulation had a motivational and not only a cognitive effect on our subjects. We now turn to a different line of research that speaks to a heretofore untested assumption of our model—that there are chronic individual differences in automatic goal activation by situational features.

CHRONIC INDIVIDUAL DIFFERENCES IN AUTOMATIC GOAL ACTIVATION: THE CASE OF SEXUAL HARASSMENT

The auto-motive model specifically postulates that direct situation-to-goal-behavior links develop from consistent and frequent conscious choice of that goal in the situation. It follows that there should be individual differences in which goals are pursued by people in identical situations. For example, in a situation in which the person has authority or official power of some sort, some individuals may have the enduring or self-defining goal of responsibly using that power and scrupulously avoiding conflicts of interest. Others, however, may constantly use their official power in unauthorized ways, such as to pursue their own, individual goals (greater power, status, wealth, etc.). Thus the chronic goal that is automatically linked to a given set of situational features may vary from individual to individual, just as which social trait construct chronically activated by a given set of behavioral features varies among people (Higgins et al., 1982).

A research program into the cognitive bases of sexual harassment (Bargh et al., 1993b) has yielded evidence relevant to this issue. On the basis of Pryor's (1987) research into individual differences in

quid pro quo sexual harassment tendencies, we first examined the hypothesis that men likely to become sexual harassers automatically associated the concepts of power and sex. In other words, when in a situation in which they had relative power over a woman (e.g., a boss-secretary relationship), those circumstantial features of power would automatically activate the goal of having sex.

Individual differences in the chronic power-sex association can be identified through Pryor's (1987) Likelihood to Sexually Harass (LSH) scale as well as Malamuth's (1988) Attractiveness of Sexual Aggression (ASA) scale. The LSH scale presents subjects with 10 scenarios in which they have some leverage or power over an attractive female and asks what the probability is that the subject would use that leverage to gain sexual favors. The ASA scale asks subjects to rate how arousing they find each of a number of sexual activities, including using force against a woman and having sex with her against her will.

In our experiment, we used a sequential priming procedure (e.g., Neely, 1977) to present a prime and a target word in rapid succession on a computer screen (250 ms apart). The subject's task was to pronounce the second of the two words on each trial as fast as he or she could; Balota and Lorch (1986), among others, have shown that pronunciation times are a sensitive and strategy-free measure of the automaticity of the association between the concepts related to the prime and target stimuli.

We had three types of stimuli: power-related words (e.g., "strong," "mighty"; from Pryor, 1987), ambiguous sex-related words (e.g., "bed," "hard," "motel"), and neutral words served as both primes and targets and in all possible combinations.² We calculated the degree to which power primed sex and sex primed power for each subject by subtracting the power-sex pronunciation latency mean from the neutral-sex latency mean, and the sex-power latency mean from the neutral-power latency mean. These scores thus represent the degree of facilitation in pronunciation times due to the presence of the power or sex prime, compared with a baseline prime condition.

Our prediction was that the power-sex facilitation effect would increase as a function of subjects' LSH and ASA (on just the forced-sex items) scores, thus demonstrating a chronic automatic association between the situational feature of power and the goal of sex. As

predicted, the stronger the subject's tendencies toward sexual harassment, the stronger the association between the concepts of power and sex, as measured by the power-sex word facilitation on the pronunciation task. There did not appear to be merely a stronger semantic association between the concepts of power and sex for the high-LSH subjects, however, because there was no such increase in facilitation obtained for sex words priming power words.

These studies document chronic differences in automatic pathways between situational features and personal goals. We believe this automatic goal activation underlies the behavioral effects that Pryor (1987) has obtained in his studies validating the LSH scale. In those studies, subjects were assigned the role of golf instructor, for example, and how close they got to and how much they touched the female cosubject (actually a confederate)—such as by putting their arms around her from behind to show her how to putt—were measured. As predicted, there was more touching and closeness the higher the subject scored on the LSH measure.

Implementation Intentions: Setting up Contingencies between Situations and Behavior

We now turn to the second type of environmental control, the formation of implementation intentions, which is the strategic effort to prepare successful responses to certain situational contexts expected to occur in the future. More specifically, the individual forms the intention to respond to a certain situation X with a specific behavior Y. Implementation intentions are quite different from what present-day psychology refers to as intentions. Psychologists commonly talk of goal intentions (see, e.g., Bandura, 1991) that specify a desired end state (which may be an outcome or consequence of some behavior or the successful execution of this behavior) that the individual intends to achieve (Ajzen, 1988; Fishbein & Ajzen, 1975). Goal intentions create a link between a desired end state and the person who forms this intention so that he or she feels committed to achieve this end state. However, the link established by the formation of implementation intentions is different. Here, a specified anticipated situational context is mentally associated with a behavior

to be performed, which results in a contingency of the sort that the individual commits himself or herself to initiate the critical behavior to be performed once the situational context is encountered.

Implementation intentions and goal intentions differ not only in terms of their structural features. They also serve a different function in people's attempts to achieve their wishes and desires. A closer look at the various problems people encounter when seeking the realization of their desires highlights the differences between goal intentions and implementation intentions. We will therefore analyze the role of goal intentions and implementation intentions through a comprehensive model of goal attainment recently introduced by Heckhausen and Gollwitzer (1987; Gollwitzer, 1990, 1991; Heckhausen, 1989). This model conceptualizes the course of realizing one's wishes and desires as the traversing of four subsequent action phases, and it is assumed that different tasks are to be solved in each phase.

In the first, the so-called *predecisional action phase*, the individual sets priorities between the many desires that are commonly entertained by deliberating on the desirability and feasibility of the wishes or desires at hand. A choice is made on the basis of these criteria so that highly attractive desires that are perceived as potentially achievable are given highest priority. In the subsequent *postdecisional, preactional phase* the individual faces the task of initiating behaviors that lead to the eventual fulfillment of the selected wishes and desires. The individual is expected to work out plans that specify *when, where, and how* this implementation is to be done, all to promote the timely initiation and effective execution of relevant behaviors and thus prevent any undue delays in achieving one's desires. Once behaviors are initiated, the individual has entered the so-called *action phase*, in which the focus is on coming up with a successful performance. In the final *evaluative phase*, the individual examines whether the outcomes obtained at last actually match what originally had been desired. If they do not, the whole sequence or parts of it may be traversed again to ensure a better agreement between actual and desired outcomes.

This sequence of action phases is a description of the conscious and reflective pursuit of one's wishes and desires. The fact that the model describes the conscious control of goal achievement makes it highly suitable for discussing the functions of intentions (Goll-

witzer, 1993). After all, intentions are conscious mental acts formed in the service of wish fulfillment. Through the model of action phases it becomes evident that goal intentions and implementation intentions are formed for different purposes; in addition, they seem to serve these purposes in different ways.

Goal intentions play their role at the transition between the predecisional action phase and the postdecisional (preactional) phase. By forming goal intentions people end deliberation over their wishes and desires and set priorities by transforming some of them into binding goals. In this way conflict is ended and the individual becomes focused on the realization of his or her goals. Goal intentions further the realization of the implied end states in various ways. First, they put an end to deliberative thoughts about the pros and cons of their pursuit (see Gollwitzer, 1991; Jones & Gerard, 1967). Second, they turn people's thoughts toward issues of implementing the chosen wish or goal (Gollwitzer, 1991; Heckhausen & Gollwitzer, 1987), directing their attention toward goal achievement. Ruminative thoughts become focused on the desired goal state (Klinger, 1975; Martin & Tesser, 1989), and the experience of not having achieved the goal creates a sense of incompleteness that leads to negative affect (Bandura, 1991) and elicits goal-directed activity (Gollwitzer & Wicklund, 1985; Wicklund & Gollwitzer, 1982). If the goal endures so that the individual keeps pursuing it over time and if these efforts are consistently paired with the same kind of situational context, goal intentions may start to guide goal-directed behaviors by the auto-motive processes described above (see also Bargh, 1990).

In the model of action phases, *implementation intentions* play a different role from goal intentions. They are formed in the postdecisional, preactional phase, when the initiation of goal-directed behaviors becomes (or is anticipated to become) a problem. According to the model of action phases their role is to promote the initiation of goal-directed behaviors. Implementation intentions are thought to ease the transition from the postdecisional, but still preactional phase to the actual, behavioral pursuit of the goal in the actional phase. Accordingly, they are a vital part of planning the execution and in particular the initiation of goal-directed behaviors and are thus understood to be in the service of a respective goal intention.

In fact the initiation of goal-directed behaviors easily becomes

delayed. For instance, people become uncertain about acting here and now, as compared with acting later and somewhere else. Such conflict may also originate from the question of showing one or the other type of behavior or using one kind of means instead of another. In any case, goal achievement is halted until such conflicts are solved. But when no conflict is experienced goal pursuit also becomes delayed whenever the individual fails to recognize a given situation as suitable for goal pursuit (i.e., as a good opportunity). Moreover, even when the individual recognizes the present situation as a good opportunity to act, the individual may fail to respond fast enough and thus let the opportunity slip by.

Many situational contexts that are highly suitable for goal pursuit and thus qualify as good opportunities fail to be exploited because they are embedded in a more complex situational context that makes them hard to detect or because they present themselves for only a short time. Relevant examples are ubiquitous in the realm of social interaction. We know from experience that, even if one has decided to end an unpleasant conversation as soon as possible (i.e., has formed the respective goal intention), it is hard to discover a good time to break it off. Often, however, it is even harder to seize a good opportunity quickly when it appears. This example seems to suggest that good opportunities are only missed when they are hard to detect or present themselves very briefly, but this is just part of the reason people frequently fail to seize good opportunities. When people are highly absorbed in some ongoing activity, wrapped up in demanding ruminations, gripped by an emotional experience, or simply tired, they may even fail to make use of opportunities that are relatively easy to detect and present themselves for some time.

Would implementation intentions prevent people from letting opportunities slip by under such adverse circumstances? We believe they would. The underlying theory is that by forming implementation intentions people transfer control over goal-directed activities from the self to the environment (Gollwitzer, 1993). The intended behavior is subjected to external control through the environmental cues specified in one's implementation intention. When these cues are encountered they are expected to prompt the intended behavior directly, that is, without further conscious thoughts directed toward the initiation of goal-directed actions. Accordingly, it is hypothesized (Gollwitzer, 1993) that this heightened behavioral readiness

rests on automatic processes. The specified opportunity sets directly in motion psychological processes that are instrumental to the execution of the intended behavior.

Before we turn to experimental studies testing this hypothesis, it seems appropriate first to demonstrate the postulated importance of implementation intentions. Thus, we asked the question of whether people actually furnish their goal intentions with implementation intentions and whether the formation of implementation intentions actually helps people to attain their goals.

Effects of Implementation Intentions on Goal Achievement

A CORRELATIONAL STUDY

Gollwitzer and Brandstätter (1990) asked female university students right before Christmas break to indicate a personal project (i.e., a goal intention) that they wanted to achieve during the break. Subjects named various projects: some were career related (e.g., writing a seminar paper), others were lifestyle related (e.g., finding a new apartment), or interpersonal (e.g., settling a fight with one's parents). To test our postulate that implementation intentions promote goal achievement, we asked subjects whether they had also formed an intention on *when* and *where* to get started. Subjects had to indicate by a simple "yes" or "no" answer whether they entertained such a supplementary intention. As it turned out, two-thirds of the subjects had formed implementation intentions.

A week after Christmas break, we wrote a follow-up letter to our subjects inquiring whether they had actually completed the critical project. They were asked to indicate on a simple questionnaire whether they had finished their project over Christmas break. Despite the heterogeneity of projects, subjects who had furnished their project with an implementation intention were significantly more successful in achieving their project during Christmas break than were subjects without an implementation intention. Actually, more than 60% of the subjects who had formed an implementation intention before Christmas did complete their project. Completion rate for

subjects without an implementation intention was much lower; less than 25%.

This pattern of data suggests that the formation of implementation intentions is an efficient strategy to promote the achievement of one's goals. The college students who used it were twice as successful in achieving their goals as were those who did not employ it. Moreover, it appears that this strategy is rather popular. Two-thirds of our subjects had turned to it in an effort to ensure the completion of their projects before the end of Christmas break. Because of the correlational nature of this study, however, having formed an implementation intention may not have been the critical variable that produced this pattern of data. Some third variable might have affected both the formation of implementation intentions and the completion of subjects' projects. To rule out such alternative explanations, we conducted an experimental study in which implementation intentions were manipulated.

AN EXPERIMENTAL REPLICATION

In this study, we created the same goal intention in all of the subjects and then randomly instructed half of the sample to form a respective implementation intention. We ran the study with a large number of male and female university students, again before their Christmas break. In a cover story they were told that we were conducting a demographic study on how people spend Christmas Eve. They should therefore write a report on how they had experienced that evening and send this report to the institute. To ensure vivid reports, they should be written no later than 2 d after Christmas Eve (in Germany December 25 and 26 are holidays).

Half the subjects were then handed a questionnaire that instructed them to form an implementation intention specifying (in writing) *when* and *where* during these two holidays they intended to write their report. These subjects picked a specific time (e.g., right after church) and a certain place (e.g., in a quiet corner in the living room) for implementing this project. The other half of the subjects (control subjects) were not requested to form such intentions. When we analyzed the reports we received after Christmas in terms of the date when they were written, it turned out that more than two-

knowledge would entail attributes one would ascribe to a friendly person. Malzacher (1992) actually used a retaliation paradigm (modeled after Zillmann & Cantor, 1976) to test this line of thought.

In her experiment, two of three groups were treated by the first experimenter in an unfriendly, provocative manner via a taped recording. The third group, who heard a neutral tape with the same voice, served as a control group. After the unfriendly episode had occurred, a second experimenter encouraged subjects in the goal-intention condition to confront the first experimenter at a later time. For subjects in the implementation-intention condition the second experimenter additionally made plans with the subjects as to when and how they would tell the unfriendly experimenter what they thought of her (in this case they were given some adequate adjectives). This resulted in the following implementation intention: "As soon as I see this person, I'll tell her what an unfriendly person she is!" Finally, all subjects were made familiar with the unfriendly experimenter (as well as other experimenters) by photographs.

In an allegedly independent second study (run by the second experimenter) subjects had to read a series of successively presented adjectives as quickly as possible from a screen. The adjective list consisted of positive and negative words, all suitable for describing people. Shortly before each adjective (average stimulus onset asynchrony [SOA]: about 100 ms), either the face of a neutral experimenter or that of the unfriendly experimenter was presented subliminally in random order. The faces were presented for an extremely short time (less than 10 ms on average) and were pattern masked. The chosen presentation time was below the individual perception threshold that had been determined at the outset of the experiment. This procedure ensures that subjects did not notice the faces presented prior to the adjectives, and, therefore, subjects' speed of reading the adjectives should not be affected by any conscious processes elicited by these faces. In addition, the narrow time gaps between the onset of the faces and the adjectives (SOAs) should also prevent conscious processes from taking control over subjects' reading responses (see Bargh et al., 1992; Neely, 1977; Warren, 1977).

In the implementation-intention condition, negative adjectives presented directly after the face of the unfriendly experimenter tended to be read faster than those presented directly after the face of a neutral experimenter. Moreover, positive adjectives were read

much more slowly after presentation of the face of the unfriendly experimenter than after presentation of the neutral face. Most important, this pattern of data was observed neither in the control group nor in the goal-intention group. Apparently, when implementation intentions are formed, negative adjectives are more easily accessible in the presence of the critical stimulus, whereas access to positive attributes is hindered. This suggests that the stimulus specified in an implementation intention directly elicits processes (here it is the activation of relevant knowledge and the inhibition of irrelevant knowledge) that facilitate the initiation of the intended action. The present findings also tell us that the mere formation of a goal intention is not sufficient to produce this effect. Apparently, automatic facilitation of action initiation only occurs when goal intentions are supplemented with implementation intentions.

SPECIFIED SITUATIONAL CONTEXTS ATTRACT ATTENTION

Chances to promote goal achievement often fail to be utilized because good opportunities that present themselves in immediate social or nonsocial surroundings escape our attention. The reason for this is that attention is focused on other things that have nothing to do with the question of how to achieve the intended goal at hand. Implementation intentions would alleviate this problem if specified opportunities and means disrupt focused attention by attracting attention to themselves. It would be particularly helpful if this attention response is automatic in the sense of being inescapable.

How does one test whether opportunity-related stimuli manage to attract attention and thus disrupt focused attention in an uncontrollable manner? A typical focused attention paradigm is the so-called dichotic listening task, in which words are presented to both ears simultaneously and subjects are instructed to repeat (i.e., shadow) the words presented to one ear (i.e., the attended channel) and ignore the words presented to the other ear (i.e., the nonattended channel). Focusing attention to the shadowed ear becomes difficult when the words presented to the nonattended ear attract attention by themselves, whether these words relate to temporarily or chronically active categories or schemata (see Johnston & Dark,

1986, pp. 63–65). Examples are words related to a personal attribute (e.g., independence) with respect to which subjects are schematic (Bargh, 1982), sexually explicit words in a college student sample high on state anxiety (Nielsen & Sarason, 1981), and word passages with which subjects had been made highly familiar before performing the dichotic listening task (Johnston, 1978). Accordingly, we hypothesized that words related to intended opportunities and means should succeed in attracting attention to themselves despite subjects' attempts effectively to shadow irrelevant words presented to the attended ear.

Whether an item presented on the nonattended channel has the potential to attract attention and thus disrupt focused attention can be assessed in two different ways, by checking whether shadowing becomes faulty, that is, shadowing speed decreases and shadowing mistakes increase (see Dawson & Schell, 1982; Nielsen & Sarason, 1981), and, more sensitively, by testing whether subjects allocate more attention to the target channel in an attempt to hinder disruption and prevent faulty shadowing (Egeth, 1967; Kahneman, 1973; Logan, 1980). The amount of attention allocated to the shadowing task is commonly assessed by the probe reaction time technique (Bargh, 1982; Johnston, 1978; Johnston & Heinz, 1978), in which subjects are instructed to optimize shadowing while using remaining capacities to respond to a subsidiary probe stimulus (e.g., quickly turning off a light that goes on at irregular intervals). It is assumed (see also Kahneman, 1973; Logan, 1979) that the more attention is required by the shadowing task, the slower are subjects' responses to subsidiary visual probe stimuli.

Following these ideas, we (with Merit Mertin) recently performed two experiments in which words related to opportunities and means specified in implementation intentions were presented to the nonattended channel in a dichotic listening task. These critical words were solicited from subjects in the following manner. First they had to name a project (i.e., goal intention) that they intended to achieve in the near future and indicate the degree to which its implementation was given priority. Then they were asked to divide the implementation of this project into five major steps and commit themselves (in writing) to when, where, and how they wanted to implement each step. From these implementation intentions we

took the critical words (i.e., the specified opportunities and means) for the dichotic listening task.

In the first study, subjects had to perform the dichotic listening task at a second visit to the institute (2 d later) where they first had to check whether their implementation intentions were still valid. Then they were asked (in an allegedly independent second study) to shadow four stimulus word blocks presented to the right ear after having worked on a sample block of words. All these words were irrelevant to subjects' implementation intentions, as were two of the four blocks of words presented simultaneously to the nonattended left ear. The other two word blocks were filled with critical words. A probing light was turned on at various points during the four stimulus word blocks, and subjects' probe reaction times were measured. Supporting our hypothesis that critical words related to specified opportunities and means attract attention, critical word lists reduced subjects' speed in turning off the probing light. Apparently, subjects had to pay more attention to the primary task (i.e., the shadowing task) and thus fell back on the subsidiary task. Moreover, with control subjects who had been yoked to experimental subjects (i.e., they studied the implementation intentions of one or the other experimental subject), we did not observe any effects of the critical word lists on probe reaction times.

In a replication study, we also assessed subjects' shadowing performance (in terms of both errors and speed), and we applied a recognition test that allowed us to determine whether subjects had switched attention to the critical words on the nonattended channel. Again, the critical words turned out to be highly disruptive to focused attention. Not only did they reduce subjects' speed in turning off the probing light as observed in the first study, they also worsened subjects' shadowing performance. As observed by Dawson and Schell (1982), shadowing errors are a clear indication that switches in attention to the nonattended channel have occurred. It is not surprising, therefore, that recognition performance was better for critical than for noncritical words.

Thus, it appears that, even when efforts to direct attention to the shadowing task are stepped up (as indicated by the reduced speed in turning off the probing light), subjects cannot escape the involuntary attention response to the critical words (as indicated by a weak shadowing and a high recognition performance). Further support

for our hypothesis that opportunities and means specified in implementation intentions are disruptive to focused attention came from control subjects who had been yoked to experimental subjects as was done in the first study. For these subjects, critical words did not produce any of the effects observed in experimental subjects.

One has to keep in mind that, in this set of two experiments, intended opportunities and means were presented to subjects in terms of a verbal description only. When subjects in everyday life actually enter a situational context that entails these opportunities and means in reality, their potential to attract attention should be even stronger. This implies that they will not escape people's attention, even when attention is focused on other things than the respective goal pursuit.

EFFICIENT ACTION INITIATION

A central feature of the automatic initiation of an action is effectiveness. Automated actions are performed swiftly once the relevant situational context is encountered. If this were true for the initiation of the behaviors specified in implementation intentions, this would not only testify to the automatic, direct control of behavior through implementation intentions but also have the pragmatic consequence that people who have formed implementation intentions can successfully use good opportunities that only present themselves very briefly.

In the domain of social influence and persuasion good opportunities to make one's point do not last forever. They are particularly short-lived when it comes to making counterarguments to an opponent's determined expression of his or her point of view. Following this line of thought in her dissertation, Brandstätter (1992, Study 1) developed a new experimental paradigm that allowed her to study whether implementation intentions lead to the swift initiation of the intended behavior when the specified opportunity is encountered. Male university students were asked to take a convincing counterposition on racist remarks made by a confederate presented on videotape; all of the subjects readily complied to this request. After the subjects were made familiar with these remarks in a first viewing of the video, a second run was carried out so that subjects could mark

those points on the tape that they considered to be suitable (i.e., a good opportunity) for a counterargument. One group of subjects was additionally asked to make a resolution to deliver certain counterarguments later at the marked places (implementation-intention condition). In a modified third run (eight new remarks of the confederate were added to the eight already presented), the subjects were finally allowed to stop the videotape at any point and deliver their opinion on audiotape.

Without subjects' being aware of it, a computer recorded the marks they had made on the videotape and also the time at which they started to speak. In this way it was possible to determine whether the subjects actually seized the opportunities they had marked on the tape for speaking up and to compute the relative frequency with which each subject spoke up within a narrowly defined critical time period surrounding the points previously marked. This relative frequency was significantly higher for the subjects in the implementation-intention condition than for control subjects, who had merely been requested to mark good opportunities without, however, forming any intentions that linked specific counterarguments to these opportunities. There was an additional control group to counter the alternative explanation that this effect was solely due to the implementation-intention subjects' concern with specific counterarguments. Subjects in this group expected to deliver specific counterarguments in writing at a later time. Still, they were comparatively less successful in using the marked opportunities to speak up than were the experimental subjects.

One might argue that subjects in the implementation-intention condition responded so readily to their "marks" because they wanted to appear consistent to the experimenter. This seems unlikely, however, because the experimenter's cover story focused subjects' concerns on choosing good opportunities to act and not on acting swiftly once these opportunities arise. Actually, subjects were not aware of the fact that the experimenter had recorded their "marks" and was thus in a position to determine how swiftly they responded to the opportunities marked. Also, at the outset of the experiment a number of personality dimensions had been measured through an adjective version (16 PA) of the 16 PF questionnaire (Brandstätter, 1988). If appearing consistent to the experimenter had been an issue for implementation-intention subjects, those high on

the dimension of social dependency should have been particularly eager to achieve consistency and thus responded most readily. This was not the case, however.

The subjects in this study all intended to achieve the goal of taking a convincing counterposition to a racist view. Still, good opportunities elicited goal-directed behaviors (i.e., presenting counterarguments) with greater speed when subjects had linked critical situations (good opportunities) to behaviors (counterarguments) by forming implementation intentions. The mental act of forming such linkages obviously managed to increase the speed of action initiation. This "speeding" effect resembles one of the consequences of habits for the initiation of behavior. As we know from learning theory, habitualized behavior is elicited with comparatively higher speed (Guthrie, 1952, 1959; Hull, 1943, 1952; Thorndike, 1913). Thus, it appears that simple mental acts (i.e., implementation intentions) can mimic a central effect of habits. This is rather amazing in view of the fact that habits commonly result from time-consuming, laborious practice.

Encouraged by these findings, Brandstätter (1992, Study 2) explored whether the quick responding to opportunities specified in implementation intentions is efficient in the sense of requiring little attentional capacity. It was hypothesized that the demands of a dual task should not be reflected in the speed of responding to the critical stimulus, because an automatic or direct control of action initiation should not put much load on limited processing resources (Kahneman & Treisman, 1984; Norman & Shallice, 1986; Posner, 1978; Shiffrin & Schneider, 1977).

Along this line of thought, subjects were asked to work simultaneously on two tasks (dual-task technique), which were both presented on a computer monitor but in two adjacent windows. The primary task consisted of working on meaningless syllables that appeared one by one at a fixed time interval. This task was presented to each subject at low and high difficulty levels (i.e., freely associate to the meaningless syllables and memorize them, respectively), and it was designed in a way that demanded complete and steady attention. The secondary task was to press a button as quickly as possible when numbers appeared but not when letters were shown. Numbers and letters were presented at random intervals, and the numbers constituted the cues for the button-press response.

Half the subjects were instructed to form the intention to respond as quickly as possible to a specific number (i.e., critical number), whereas the other half (control group) were asked to familiarize themselves with the critical number by repeatedly writing it on a sheet of paper. Both groups of subjects were told to do this for the purpose of speeding up their responses to this number. Still, no difference in the speed of the pressing response for critical and noncritical numbers was observed for control subjects. In the implementation-intention group a marked acceleration of responding to the critical number was observed, which was undertaken without being detrimental to the speed of responding to noncritical numbers (the speed for noncritical numbers was similar to that of the control group). Also, this pattern of data was not affected by the level of difficulty of the primary task.

The results of both studies suggest that the initiation of behavior can be speeded up by forming implementation intentions. Most interesting, this effect seems to occur automatically in the sense of not requiring much processing capacity. Once the specified opportunity is encountered, action initiation is promoted very efficiently so that the individual's performance on dual tasks does not suffer.

Implications and Prospects

The research we have presented on how implementation intentions work suggests that the formation of an implementation intention is a conscious act that has automatic consequences. This discovery calls into question two currently popular views in research on automaticity. First, automatic control of behavior is commonly seen as a result of frequently performing this behavior in the same type of situation (e.g., Shiffrin & Schneider, 1977; for an exception see Logan, 1988). Contrary to this view, our experiments document that automatic processes instigated by implementation intentions are the result of a single mental act (i.e., the formation of an implementation intention). The type of automaticity observed in our experiments apparently plays by different rules. It seems possible that the commitment (or willpower) people attach to the situation-behavior contingencies they proclaim in their implementation intentions creates strong links, a strength that commonly can only be attained through

frequent and consistent situation-response pairing. A second and related popular view in automaticity research is that only habituated behaviors can be subject to automatic control, whereas the effective execution of willed or intended behaviors requires conscious control (see, e.g., Norman & Shallice, 1986). Again, our studies do not square with this view. The behaviors affected by implementation intentions are definitely intended and willed; still, they were subject to automatic processes.

Our findings are also relevant to recent theoretical work on planning as presented by cognitive psychologists (e.g., Bruce & Newman, 1978; Hayes-Roth & Hayes-Roth, 1979; Kreidler & Kreidler, 1987; Mannes & Kintsch 1991) and researchers in the field of artificial intelligence (Wilensky, 1983). Both of these research traditions construe planning in terms of the processes that lead to the viable sequencing of behaviors so that certain behavioral tasks or goals, such as fetching a book from the library, are performed smoothly and effectively. It seems plausible to assume that this kind of planning is subjected to conscious control as it demands the mental simulation of future events, activities, and hindrances (Miller et al., 1960; Taylor & Schneider, 1989).

In addition, the translation of such a plan into action should be primarily based on conscious control, because the execution of this plan is not overlearned and thus has not been habituated. As a consequence, the plan needs to be retrieved from memory once the individual sets out to solve the task, and the various steps of the plan will be implemented in an intentional and controlled manner that should demand much attentional capacity.

Our research on implementation intentions suggests that people can (and do) complement the more complex and analytic form of planning by a comparatively simple and crude form of planning, that is, the formation of implementation intentions. Here, the individual commits himself or herself to initiating a certain behavior in the presence of a specified situational cue. This strategically formed contingency apparently leads to the direct control of the intended behavior through the situational cue. Possibly the strongest support for the proposition that these distinct aspects of planning are subject to different modes of control (i.e., conscious vs. automatic) comes from neuropsychology. Patients with lesions to the prefrontal region of the brain show major impairments when it comes to planning in

the form of finding a viable route to the solution of a given behavioral problem (see Shallice, 1982). This effect is not surprising, because the frontal lobe is commonly considered to be the site of conscious control of thought and action (Luria, 1966; Walsh, 1978), and this type of planning requires conscious control. Most interesting, however, frontal lobe patients do not evidence any impairments when it comes to the aftereffects of planning in the sense of forming implementation intentions. In a recent dissertation experiment with frontal lobe patients, Lengfelder (1994) discovered that implementation intentions speed up the initiation of intended actions in the same way as was observed with university students (see Brandstätter, 1992, Study 2). Apparently this speed-up effect is based on automatic control processes; no conscious control is needed.

When do people form goal intentions? So far we have not conducted any research on when people form goal intentions, but we assume that they only form implementation intentions when they anticipate problems on the way to goal attainment; otherwise, their formation is unnecessary. This hypothesis corresponds with William James's (1890) distinction between *ideo-motor* action and *willed* action. According to James the application of will can only be expected when resistance to performing an action is anticipated or experienced by the individual. Most action, however, is mere *ideo-motor* action; thinking about the consequences of an action is quickly followed by its execution.

Indirect empirical support for our hypothesis that implementation intentions are formed when people anticipate barriers and hindrances comes from research on action identification theory (Vallacher & Wegner, 1985, 1987). This theory proposes that people may conceive of their goal pursuits at different levels of abstraction. High levels of identification define goals in terms of their ultimate purpose (e.g., getting exercise), whereas low levels of identification refer to the implementational steps (e.g., going to the gym after dinner). Although people generally prefer high levels of identification, they move toward low-level identifications whenever goal achievement becomes problematic (Vallacher et al., 1987). This tendency to think about the implementational intricacies once goal pursuit is hampered is a first step toward actually forming implementation intentions.

The hypothesis that people form implementation intentions only when problems in achieving the goal are anticipated implies that people may differ in their tendencies to form implementation intentions. It seems plausible that people who worry much about the successful implementation of their goals anticipate more hindrances than those who refuse to worry. As a consequence, the latter should be less willing to prepare themselves for these hindrances and therefore fail to form implementation intentions. Cantor (in this volume) has recently suggested individual differences that pertain to the strategies people prefer in achieving their life tasks. For instance, in the realm of achievement-related life tasks, such as being productive at work or getting tenure, Norem and Cantor (1986) discovered a strategy called "defensive pessimism" that is successfully used by people who suffer from fears in achievement settings. It implies a concern with the details of the upcoming achievement task, and preparing oneself ahead of time for performing this task. It seems likely that forming implementation intentions comprises part of this preparation. From this perspective it comes as no surprise that the strategy of defensive pessimism allows for efficient performance once the individual actually starts working on the achievement task (Showers, 1992).

The interplay of goal intentions and implementation intentions. The relation of the two types of intentions has been the starting point of an irreconcilable controversy in traditional German will psychology (see Ach, 1935, vs. Lewin, 1926, 1951). Two recent observations suggest that the effectiveness of implementation intentions is independent of the strength or importance of the respective goal intention. First, in an experimental study (Gollwitzer et al., 1990) subjects formed implementation intentions with respect to their wishes, that is, they had not yet formed goal intentions and were still undecided over pursuing the wish. Although these implementation intentions were not backed up by goal intentions, they proved to be effective. Subjects with implementation intentions evidenced an immediate and delayed (by 3 wk) increase in their readiness to form goal intentions, that is, in their willingness to turn their wishes into action. Second, research on action slips has identified a certain type of slip that further suggests that the effects of implementation intentions unfold independently of the respective goal

intention. These action slips occur because the situation specified in an implementation intention still triggers the intended behavior although the respective goal intention had already been achieved by some other type of action (Heckhausen & Beckmann, 1990) or had become obsolete (Birenbaum, 1930).

As much as these observations speak for independence of implementation intentions and goal intentions, it is easy to find convincing arguments for the counterposition of dependence. After all, action slips of the kind noted above are the exception rather than the rule. This implies that implementation intentions possess the potential to be sensitive to the strength of the respective goal intention. Accordingly, one would expect that, in the retaliation study reported above (Malzacher, 1992), an apology should not only weaken subjects' goal intention to retaliate (see Ohbuchi et al., 1989); the observed effects on reading speed for positive and negative adjectives when primed subliminally by the face of the critical experimenter should also be attenuated. In other words, situations specified in implementation intentions should no longer trigger automatic processes that help the initiation of the intended behavior once the goal intention to retaliate has become obsolete.

In any case, there are good arguments for the dependence as well as the independence of implementation intentions and goal intentions. Given this state of affairs, empirical research on the interplay of goal intentions and implementation intentions should attempt to identify the conditions that make the effects of implementation intentions sensitive to the strength of the respective goal intention.

Impulse Control. So far we have studied the role of implementation intentions and the respective processes in the context of action initiation. But getting started may only be one of the conditions in which it pays to form implementation intentions; controlling one's impulses might be another. Imagine a person who has decided to stop drinking (i.e., formed the respective goal intention of staying away from alcohol) but is still tempted to take a sip of wine whenever he or she opens the refrigerator. One effective way of preparing for this temptation may be the formation of an implementation intention that favors the execution of an antagonistic behavior, such as eating instead of drinking (e.g., "I'll grab a bite to eat whenever I open the refrigerator").

It seems possible that this implementation intention will effectively suppress any competing responses related to drinking alcohol, at least in this situation. This possibility raises the question of whether urges related to harassment (as presented above) may also be curbed through the formation of implementation intentions. The problem, however, seems to be that people who are driven by such urges are not aware of the eliciting situational cues (i.e., the power-related stimuli in the interpersonal situation). Thus, even if harassers form the goal intention to prepare themselves against these urges, they would not know which situational cues to specify in their implementation intentions. In this case, some outside counseling on this matter would seem indispensable.

General Conclusion

The recent resurgence of research on goals (Bandura, 1991; Locke & Latham, 1990) has construed their operation by means of rather complex conscious processes rather than direct regulating action. For instance, studies by Bandura and Cervone (1983; see also Becker, 1978; Strang et al., 1978) point to the cognized discrepancies between actual performance and the to-be-achieved performance (standards) as specified in one's goals. It is assumed that experienced discrepancies create dissatisfaction (a negative incentive) that in turn instigates goal-directed action. The experience of a discrepancy is the result of explicit comparative thoughts, so this type of instigation of goal-directed activity must be considered conscious and deliberate.

There is a further conscious process related to the instigation of goal-directed action, one that works as a moderator of the instigation of goal-directed action through cognized discrepancies. It is the individual's thoughtful reflection on his or her capabilities to reduce the experienced discrepancy. People start to reduce the discrepancy only when they reach the conclusion that they possess the relevant capabilities (high respective self-efficacy beliefs; Cervone, 1989; Cervone & Peake, 1986; Peake & Cervone, 1989).

In the process of judging their capabilities, people may become involved with yet another conscious mental activity that is instrumental to goal achievement, that is, the preparation of the initiation and execution of goal-directed efforts aimed at discrepancy reduc-

tion by more or less thoughtful planning. There is evidence that goal setting per se manages to stimulate people to develop plans on how to attain their goals (Earley et al., 1987; Heckhausen & Gollwitzer, 1987; Smith et al., in press). No explicit experience of a discrepancy between actual performance and the performance one seeks to attain has to be induced to instigate planning.

Finally, there is a conscious mental strategy that positively affects goal-directed activities by focusing on the goal-related end states or standards. People can toy with raising or reducing these end states or standards. They are expected to employ this strategy, for instance, when they have just achieved a medium-level standard. By reactively raising the standard, they strategically induce a new discrepancy that in turn stimulates the initiation of further goal-directed activities (Bandura & Cervone, 1986).

None of these different but highly effective ways of consciously controlling goal-directed action have been discussed in this chapter. We do not doubt the powerful effects that conscious thought has on people's goal pursuits. Our concern is a different one: we want to point to the role of automatic processes in people's goal-directed activities. As the findings reported in this chapter suggest, individuals can capitalize on nonconscious processes. Actually, this direct control of goal-directed action is a vital aspect of people's attempts to achieve their goals, and therefore the resurgence of goal psychology should not diminish their importance. It remains to future research to analyze questions of how conscious and automatic control of goal-directed action interrelate, when and where each of these types of control is most effective, and what strengths and weaknesses are associated with conscious as compared with direct, environmental control of goal-directed action.

NOTES

1. There were more females than males in the experiment, so their data contributed more to the overall means.

2. The rationale for using the ambiguous sex words instead of more obviously sex-related words (e.g., "sex," "intercourse," "fondle") is that subjects may well have hesitated to say them in the pronunciation task, and even a slight hesitation would greatly distort those times (which averaged less than half a second per word in the experiment).

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Social Intelligence and Intelligent Goal Pursuit: A Cognitive Slice of Motivation

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Introduction

As personality psychologists, we bring to this symposium volume a view of human social functioning that emphasizes the intertwining of cognition and motivation, the dynamics of person-by-situation interactions as individuals struggle to make sense of experience in the light of their preconceptions, goals, and needs, and the social "press" of their life environment. Such a perspective has a long and distinguished history in our field, represented both by cognitive-personality theorists following from George Kelly; by motivational-personologists in the tradition of Henry Murray, and by interpersonal-cultural theorists influenced by Adler, Harry Stack Sullivan, and Erik Erikson. Rather than try to do justice to the richness and variety of this tradition, it is our intention to look at one slice—a *cognitive slice*—of motivation and social adjustment.

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