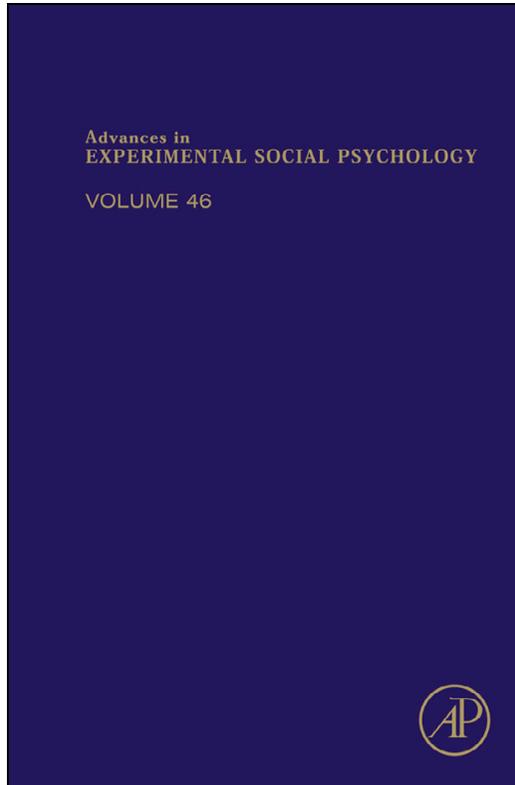


**Provided for non-commercial research and educational use only.  
Not for reproduction, distribution or commercial use.**

This chapter was originally published in the book *Advances in Experimental Social Psychology*, Vol. 46 published by Elsevier, and the attached copy is provided by Elsevier for the author's benefit and for the benefit of the author's institution, for non-commercial research and educational use including without limitation use in instruction at your institution, sending it to specific colleagues who know you, and providing a copy to your institution's administrator.



All other uses, reproduction and distribution, including without limitation commercial reprints, selling or licensing copies or access, or posting on open internet sites, your personal or institution's website or repository, are prohibited. For exceptions, permission may be sought for such use through Elsevier's permissions site at:

<http://www.elsevier.com/locate/permissionusematerial>

From: Robert S. Wyer, Alison Jing Xu and Hao Shen, The Effects of Past Behavior on Future Goal-Directed Activity. In James M. Olson and Mark P. Zanna, editors:

*Advances in Experimental Social Psychology*, Vol. 46,  
Burlington: Academic Press, 2012, pp. 237-283.

ISBN: 978-0-12-394281-4

© Copyright 2012 Elsevier Inc.

Academic Press

# THE EFFECTS OF PAST BEHAVIOR ON FUTURE GOAL-DIRECTED ACTIVITY

Robert S. Wyer Jr.\* Alison Jing Xu,<sup>†</sup> and Hao Shen\*

## Contents

1. A Description of Goal-Directed Processing	239
1.1. General considerations	239
1.2. Goals and awareness	240
1.3. The use of procedures in conscious decision making	241
1.4. The activation and use of productions	244
1.5. General implications	246
2. The Role of Plans in Deliberate Goal-Directed Behavior: The Impact of Behavioral Mind-sets	247
2.1. Counterarguing and bolstering mind-sets	248
2.2. Counterfactual reasoning mind-sets	249
2.3. Behavior decision making	250
2.4. Variety seeking mind-sets	252
2.5. Motivation-induced mind-sets	253
3. The Effect of Productions I: Attention and Information Seeking	256
4. The Effect of Productions II: Comprehension	259
4.1. Visual versus verbal information processing	259
4.2. Level of abstractness	263
4.3. Holistic versus piecemeal comprehension	264
4.4. Relational comprehension processes	266
4.5. Spontaneous categorization processes	268
5. The Effect of Productions III: Overt Behavior	269
5.1. Anchoring and adjustment	269
5.2. Effects of cognitive load	270
5.3. Goal-directed versus production-controlled processing	271
6. Relation to Other Formulations	273
6.1. Other dual-processing models of behavior	273
6.2. Habits	274
6.3. The “perception–behavior” link.	275
7. Concluding Remarks	276

\* Department of Marketing, Chinese University of Hong Kong, Shatin, NT, Hong Kong

<sup>†</sup> Rotman School of Management, University of Toronto, Toronto, Ontario, Canada

Acknowledgments	277
References	277

## Abstract

Performing a cognitive or motor behavior in one situation can influence the likelihood of performing a conceptually similar behavior in a second, often unrelated situation. The effects can be mediated by a conscious decision about how to attain this objective or they can occur automatically without awareness of either the goal to which the behavior is relevant or even the behavior itself. These effects may be governed by different cognitive systems. A conceptualization of these systems and how they interface is used as a framework for understanding the effects of past behavior on information processing at several stages, including the attention to information, comprehension, evaluation, response generation, and decision making. Furthermore, the influence of motivation on goal-directed behavior is distinguished from the impact of procedural knowledge that is activated and applied as a consequence of this motivation.

Deciding which of two animals is heavier can increase the likelihood of buying one of the several snacks that are on sale after the experiment (Xu & Wyer, 2008). Providing the same answer to a series of questions about animals (e.g., “Which is friendliest: a dog, a lion or an elephant?,” “Which is smallest, . . .?,” etc.) decreases the number of different types of tea that individuals choose to drink over a 5-day period (Shen & Wyer, 2010). Rank ordering students’ examination scores from high to low can increase the attention that people pay to high (vs. low) ratings of a consumer product and, therefore, can increase their own evaluation of the product (Shen & Wyer, 2008). Shadowing a speech that is delivered at either a fast or a slow rate can affect the speed of completing an unrelated opinion questionnaire (Shen, Wyer, & Cai, 2012).

Each of these quite different phenomena exemplifies the effect of individuals’ goal-directed behavior in one situation on the behavior they perform in the pursuit of a quite different objective in a later, unrelated situation. However, the studies differ in one important respect. In the first two sets of studies mentioned (Shen & Wyer, 2010; Xu & Wyer, 2008), people consciously used a particular procedure to attain a goal (deciding which of two snacks to purchase, deciding on which teas to drink) but were unaware of why they selected this procedure rather than other, equally effective courses of action. In the last two sets of studies (Shen, Jiang, & Adaval, 2010; Shen & Wyer, 2008; Shen, Wyer, et al., 2012), however, individuals’ past behavior apparently influenced their later goal-relevant behavior (their relative attention to high vs. low stimulus ratings, or their speed of completing a questionnaire) without awareness of the behavior itself.

The effects exemplified by these two sets of studies may be governed by two different cognitive systems. One system controls the deliberate consultation and use of goal-relevant concepts and knowledge in deciding whether and how to pursue an objective of which persons are well aware. The other system consists of cognitive and motor *productions* similar to those postulated by Anderson (1982, 1983; Anderson, Bothell, Lebiere, and Matessa, 1998; see also Smith, 1984, 1990), which elicit behavior automatically, without awareness and with little if any cognitive effort. The behavior that is governed by both systems is influenced in part by concepts and mental representations that are drawn from declarative knowledge. However, quite different cognitive processes underlie their operation.

In this chapter, we provide a conceptualization of these processes and how they interface. Although the conceptualization can be applied to the cognitive processes that underlie behavior in general, we do not attempt to discuss all of its implications. Rather, we use it as a framework for interpreting the effects of past behaviors on subsequent behaviors and decisions. The behaviors we consider are often not single actions but rather comprise sequences of cognitive or motor *procedures* that facilitate the attainment of a particular objective. These procedures can be employed at different stages of cognitive functioning, including the selective attention to input information, the comprehension of this information, inference and evaluation, response generation, and decision making. In the course of our discussion, we distinguish not only between deliberative and automatic processes but also between the effects of a procedure and the effects of the semantic concepts that are activated in the course of employing it. Finally, we distinguish between the cognitive and motivational influences of past behavior.



## 1. A DESCRIPTION OF GOAL-DIRECTED PROCESSING

### 1.1. General considerations

The effects of performing a behavior on later behavior and decisions are guided in part by principles of knowledge accessibility (for reviews, see Förster & Liberman, 2007; Higgins, 1996; Wyer, 2008). With few exceptions, however (Smith, 1984, 1990, 1994), formal theories of knowledge accessibility have traditionally focused on the impact of declarative knowledge (semantic concepts and schemas, beliefs, values, etc.) on the interpretation of new information and the inferences that are made on the basis of it. Several recent studies have demonstrated the generalizability of this impact, showing not only the unconscious influence of semantic concepts and knowledge on overt behavior (for reviews, see Bargh, 1997; Dijksterhuis & Bargh, 2001) but also the effects of overt behavior (e.g., nodding or shaking the head) on the activation and use of semantic knowledge (Förster

& Liberman, 2007). However, the cognitive mechanisms that underlie these effects remain unclear (cf. Dijksterhuis, Smith, van Baaren, & Wigboldus, 2005; Janiszewski & van Osselaer, 2005).

Moreover, neither area of research and theorizing has implications for the way in which one's explicit or implicit *behavior* in one situation can influence the likelihood of performing a conceptually similar behavior in a second, unrelated situation. This influence is likely to be mediated by semantic concepts that are activated in the course of performing the initial behavior rather than by the behavior itself. However, the nature of these concepts and how they come into play have not been articulated.

## 1.2. Goals and awareness

A particular procedure can often be relevant to the attainment of several goals, and individuals are unlikely to be aware of them all unless the goals are called to their attention. The cognitive and motor behaviors of concern in this chapter are performed in the course of pursuing a goal of which people are aware. However, a behavior can often be incidental to the goal that people are consciously pursuing, while facilitating the attainment of other goals of which individuals are unaware. In a study by Chartrand and Bargh (1996), for example, unobtrusively activating concepts associated with forming either an impression or memory led participants to process behavior descriptions in a way that facilitated the attainment of these objectives. Participants obviously processed the descriptions with *some* conscious objective in mind, if only to comply with the instructions they were given in the experiment (e.g., to read the statements for the purpose of answering questions about them later). However, they were unaware that the cognitive operations they performed in pursuit of this objective were also relevant to a *different* goal than the one they were consciously pursuing.

This example makes salient a distinction between (a) individuals' consciousness of the goal they are pursuing and (b) their consciousness of *how* they are pursuing it (see Gollwitzer, Heckhausen, & Steller, 1990, for a similar distinction). In some cases, the selection of a goal can be deliberate but its implementation may be automatic. People often consciously decide the point they want to make in an argument without being conscious of how they construct the statements they use to convey this point. Or, a driver might decide to turn right at an intersection without awareness of the motor actions involved in implementing this decision. A well-known study by Bargh, Chen, and Burrows (1996) provides an empirical example. Participants who had unobtrusively been primed with concepts associated with the elderly walked more slowly to the elevator upon leaving the experiment. These individuals were presumably aware of the goal they were pursuing (getting to the elevator). However, they were unlikely to be aware of the procedure they used to attain it (walking slowly).

This example makes salient a further distinction. That is, a behavior can sometimes be a goal that individuals are motivated to perform, either because it is intrinsically desirable or because it is instrumental to the attainment of a higher order objective. In this case, activating a concept of this goal may stimulate a conscious decision to perform the behavior. However, individuals may also have a semantic concept of the behavior itself that is descriptive in nature (thus being applicable to others' actions as well as one's own) and does not have any motivational implications. Thus, the same action (e.g., walking quickly) could be the referent of both a *goal concept* and a *behavior concept*. These concepts can play different roles in cognitive functioning. In the remainder of this section, we first describe the processes that underlie the conscious selection and use of a procedure in the course of goal-directed processing (albeit without awareness of the reason for its selection). We then consider the processes that underlie the automatic application of a procedure. Finally, we discuss the manner in which these different processes interface.

### 1.3. The use of procedures in conscious decision making

#### 1.3.1. Structural considerations

Declarative knowledge comprises the *content* of cognition. It includes semantic concepts that are used to interpret single pieces of information; more complex representations of particular persons, objects, and events; narrative representations of either one's own or another's personal experience (Schank & Abelson, 1995); and implicit theories (Dweck, 1991; Dweck, Chiu, & Hong, 1995; Ross, 1989; Wyer, 2004, 2007). The representations of primary concern in this chapter describe procedures, that is, the sequences of steps that can be taken to attain a particular objective.

Following Kruglanski et al. (2002; see also Schank & Abelson, 1977), we assume that a goal concept is generally associated in memory with a sequence of concepts that, in combination, describe a *plan*, or procedure that can be used to attain it. These plan-goal associations are represented as conceptual units, thus having the status of prototypic event schemas (Wyer, 2004; Wyer & Radvansky, 1999) or scripts (Graesser, 1981; Schank & Abelson, 1977). The concepts that compose a plan typically refer to *subgoals*, the attainment of which facilitates the attainment of the superordinate goal with which they are associated. These subgoals are themselves likely to be associated with a plan for attaining them. Consequently, goal and subgoal concepts are hierarchical. For example, "going to the theater" may be associated with a plan for "getting tickets," "driving to the theater," etc. "Getting tickets," in turn, may be associated with a plan for "calling for tickets," and "making reservations," and the subgoal "calling for tickets" might be associated with a procedure for "looking up the number," "dialing," etc.

Complications arise in conceptualizing the organization of these concepts.

1. Goal and subgoal concepts can exist at different levels of abstractness (“eating dinner at Yeng Ching,” “eating at a Chinese restaurant,” “dining out,” etc.). The plan for attaining the goals specified by these concepts can likewise vary in abstractness. Thus, two situation-specific goals (e.g., deciding which of two persons to hire as a research assistant and deciding which of two MP3 players to buy) might exemplify the same more general one (making a comparative judgment).
2. Two related considerations are reflected in Kruglanski et al.’s (2002) conceptualization of *equivinality* and *multifinality*. That is, more than one plan can be associated with the same goal. For example, deciding between two alternatives could be done by either (a) computing an overall evaluation of each alternative and comparing these evaluations or (b) determining which alternative is superior on the greater number of dimensions. By the same token, a subgoal might be a component of more than one plan, each of which is associated with a different superordinate objective. (For example, “calling for reservations” might be part of both a plan to eat at a restaurant and a plan to fly to Hawaii.)
3. The attainment of goals and subgoals at higher levels of generality requires conscious decisions. Thus, attainment of the goal of “going to the theater” involves a decision to call for reservations, and so on. However, the attainment of subgoals at low levels of generality (e.g., dialing the telephone number) requires much less cognitive deliberation and many components of the procedure for attaining them may be activated and performed unconsciously. (We elaborate this possibility later in this section.)

### 1.3.2. Processing considerations

As we noted earlier, the accessibility of goal concepts in memory is governed by processes similar to those that influence the accessibility of declarative knowledge more generally (Förster & Liberman, 2007; Higgins, 1996; Wyer, 2008). Several metaphorical conceptualizations of this process are potentially viable (e.g., Higgins, Bargh, & Lombardi, 1985; Ratcliff, 1978; Wyer, 2004; Wyer & Srull, 1989). Of these, the best known is the spreading activation formulation of associative memory proposed by Collins and Loftus (1975) and extended to social memory by Wyer and Carlston (1979). Although this conceptualization has limitations (Smith, 1990; Wyer & Srull, 1989), it is particularly useful for describing the processes we assume.

According to a spreading activation model, concepts are represented in memory by nodes and their associations by pathways that connect them. “Excitation” theoretically accumulates at a concept node as a result of thinking about externally or internally generated stimuli to which it

pertains. When the excitation at a node reaches a particular threshold, the concept is activated (called into consciousness). Excitation then spreads from this concept node to others along the pathways connecting them. The excitation that accumulates at these peripheral nodes increases the likelihood that the concepts located at these nodes are later activated by excitation from other sources. In this regard, the excitation that is transmitted to a concept in the course of goal-directed cognitive activity is not always sufficient to activate it (i.e., to call the concept into conscious awareness). Nevertheless, this residual excitation can increase the likelihood that the concept is later activated in the course of cognitive activity to which it is potentially relevant.

### 1.3.3. Implications for goal-directed processing

When individuals are stimulated to attain a particular objective (e.g., “eating dinner at Yeng Ching”), they search memory for a concept that it exemplifies. If a concept of this specific objective already exists, it is identified. Otherwise, a more abstract goal concept (e.g., “eating dinner at a restaurant,” “dining out”) is identified on the basis of a subset of the features that characterize the goal being sought. Other features of the abstract concept (e.g., “restaurant”) are then instantiated in terms of additional features of the specific goal at hand (“Yeng Ching”). (For an elaboration of this process, see [Rumelhart, 1984](#).)

Once a relevant goal concept is identified, it can spontaneously activate a plan with which it is associated ([Kruglanski et al., 2002](#)) and the feasibility of applying the plan is assessed. If two or more plans are potentially feasible, the one that comes to mind most easily is considered, and a decision is made to attain the subgoals that compose it. The decision to attain a particular subgoal then activates a plan for attaining this subgoal, leading to the identification of a plan at a lower level of abstractness, and so on.

As noted earlier, the concepts that are involved in the course of this goal-directed cognitive activity theoretically transmit excitation to more general concepts that they exemplify. Consequently, the general concepts become more accessible in memory, and this leads other exemplars of the concepts to become accessible as well. As a result, plans that contain these exemplars are more likely to be activated and used in a later situation to which they are applicable. Moreover, this can occur without consciousness of the reason why the procedures come to mind.

These processes provide an account of the manner in which previous goal-directed activity can influence the procedures that are identified and used in subsequent goal-directed processing. Note, however, that these processes govern conscious *decisions* to take the steps necessary to attain a goal. They do not indicate how the subgoal concepts involved in these decisions become transformed into the specific cognitive and motor behaviors that are involved in implementing them (e.g., the manner in which the

concept “dialing the telephone number” gives rise to the motor behavior involved in attaining this objective). This behavior is theoretically governed by a different mechanism.

## 1.4. The activation and use of productions

### 1.4.1. Structural considerations

Our conceptualization of the automatic activation of cognitive and motor behaviors is stimulated by a formulation proposed by Anderson (1982, 1983, 1996; Anderson et al., 1998). Specifically, we assume that as a result of repetition, individuals learn cognitive or motor behavioral routines that, once acquired, can be performed with little if any cognitive deliberation (Schneider & Shiffrin, 1977). These routines and the stimuli that give rise to them can be conceptualized as *productions* of the form “if [X], then [Y]” or  $[X] \rightarrow [Y]$ , where [X] is a configuration of stimulus features, and [Y] is a sequence of cognitive or motor responses that are activated and performed automatically when the conditions specified in [X] are met. Thus, as a simplified example, one of the productions that govern a drive to Wal-Mart might have the form [Wal-Mart, “Prospect Street,”...]  $\rightarrow$  [“turn left”], where the components of the precondition include a concept of the destination and a stimulus cue (the “Prospect Street” sign) and the expression on the right denotes a sequence of motor behaviors that are performed automatically in response to this precondition.

Like Anderson et al. (1998), we assume that a precondition ([X]) is composed of “chunks” of declarative knowledge. These “chunks” can include both behavior concepts and features of the immediate situational context. They can also include thoughts, feelings, visual images, and proprioceptive stimulation. Thus, the features can be coded nonverbally as well as verbally and can be perceptual as well as conceptual. This latter assumption allows a production to be activated by perceptual as well as conceptual cues (cf. Goldstone & Barsalou, 1998).

The features of a precondition are normally responded to as a configural whole without analyzing their individual features (Anderson et al., 1998). For example, an individual might identify a person as American or European, or might appraise a social group as hostile or friendly, without consciousness of the individual features that give rise to this reaction. This possibility has three related implications.

1. A production can be activated without awareness of all of the stimuli that compose its precondition.
2. Not all of the features of a precondition need to be present in order to elicit the behavior associated with it. Rather, if a global appraisal is sufficiently similar to production's precondition, the behavioral sequence associated with it will be spontaneously activated and applied.

3. Any individual feature of a precondition may have little impact in the absence of other features that accompany it. To give an obvious example, an experienced driver who encounters a red light may spontaneously raise his foot and press the brake pedal. When the individual is a pedestrian, however, the red light is likely to elicit quite different behavior. Thus, the red light in isolation is not sufficiently similar to the configuration of features associated with the motor responses involved in “braking” to elicit these responses.

An assumption underlying our conception of a production is important. That is, although the precondition of a production can include a goal concept, this is not necessary. As exemplified by Chartrand and Bargh's (1999, 2002) research on mimicry, another person's behavior (e.g., rubbing his face) along with situation-specific features can activate a production in the absence of any goal that requires it. Moreover, a behavior concept (e.g., “walking slowly,” as in our earlier example) could combine with situational features to activate the behavior it describes. In short, although the behavior that is governed by a production may be *relevant* to the attainment of a goal, it may be elicited by a precondition that does not contain a concept of this goal. Empirical implications of this difference will be described presently.

#### 1.4.2. Acquisition and application

Productions are normally acquired as a result of repeatedly consulting and applying procedures that have been stored as part of declarative knowledge (but see Dunham & Banaji, 2010; Huang & Bargh, 2008, for possible exceptions). When individuals are learning to drive a car or to use a word processor, they consult their declarative knowledge repeatedly in order to determine the sequence of motor acts that are necessary to attain the objective at hand. With practice, however, the procedures gradually become automated and are performed with little if any cognitive mediation (Schneider & Shiffrin, 1977). The transition from procedure- to production-based processing may be similar to that captured by a “race” model (Logan, 1988). That is, both deliberate and automatic procedures can act simultaneously under conditions in which they are applicable, and the one that yields a solution more quickly wins the race. Thus, at early stages of learning, behavior is governed largely by deliberative processing, but with practice, production-based operations become more efficient and ultimately take over.

Many productions are learned in the course of engaging in situation-specific, goal-directed behavior. However, the situation-specific concepts that are called to mind in the course of this learning may exemplify more general ones, and these general concepts also become associated with the behavior being learned. As a result, although the sequence of behavior that is governed by a production ([Y]) is situation specific, its precondition ([X]) can include both abstract and situation-specific features. For example,

a general behavior concept (making comparative judgments) might combine with a situation-specific concept (e.g., “two animals”) to elicit a production-governed comparison process that is specific to this type of stimulus. On the other hand, the same behavior concept along with descriptions of two vacation spots, or two individuals’ trait descriptions, might elicit a production that is specific to these types of stimuli instead.

### 1.4.3. The deliberative–automatic interface

The production construct is particularly useful in conceptualizing the interactive effects of deliberative and automatic processing. A sequence of goal-directed activity can often involve a number of productions, each stimulated by concepts that are drawn from declarative knowledge at different points in the decision sequence. In our earlier example, driving to Wal-Mart might involve turning right at the first stop sign, continuing to “Prospect Street” and turning left. These stimuli and the decisions they activate are likely to be conscious and deliberate. However, the behaviors that result from these decisions (stopping, turning right, etc.) may be governed by productions and performed automatically with little cognitive mediation.

To reiterate, the precondition of a production is likely to contain both a behavior concept and features of the specific situation at hand. Therefore, different productions could be activated by either (a) the same behavior concept in combination with different situational features or (b) different behavior concepts in the context of the same situational features. For example, suppose an individual who wishes to shop at Wal-Mart has formed the following three productions:

- [shop at Wal-Mart; stop sign] → [turn right];
- [shop at Wal-Mart; “Prospect Street” sign] → [turn left];
- [go to work; “Prospect Street”] → [turn right].

The first two productions might be invoked sequentially when the relevant situational features are encountered. (Concepts activated by other, unexpected objects and events that are encountered en route [e.g., a pedestrian crossing the street] could also elicit a production.) As noted earlier, however, a production can sometimes be activated by features that are fortuitously accessible in memory at the time and happen to be part of its precondition. Thus, the coexistence of the third production could explain why the person who intends to shop at Wal-Mart but happens to be thinking about a meeting he had the previous day might suddenly find himself in front of his office building rather than in front of the department store.

## 1.5. General implications

Our conceptualization has implications for phenomena addressed by other recent theoretical formulations of social behavior, including those that concern (a) dual-processing analyses of behavior (Strack & Deutsch, 2004),

(b) habits (Wood & Neal, 2007), and (c) the perception–behavior link (Dijksterhuis & Bargh, 2001). The relations of these formulations to the one we propose are discussed in the last section of this chapter.

However, the conceptualization's implications for the impact of past goal-directed behavior on future cognitive and motor activity are particularly noteworthy. Different mental processes theoretically govern (a) the decisions that individuals make deliberately in the course of pursuing an objective and (b) the cognitive and motor behaviors that occur in the course of implementing these decisions. These processes can operate at several different stages of cognitive activity. In the following sections, we first summarize research on the effect of past behavior at the inference and decision stages, focusing largely on the impact of behavioral mind-sets. We then turn to the influence of productions on behavior that occurs automatically and without awareness during the course of (a) attention and information seeking, (b) comprehension, and (c) the generation of an overt response.

## 2. THE ROLE OF PLANS IN DELIBERATE GOAL-DIRECTED BEHAVIOR: THE IMPACT OF BEHAVIORAL MIND-SETS

Individuals consciously decide on a plan for attaining the goal they happen to be pursuing. When several strategies are generally applicable, however, they may choose the plan that comes to mind most easily and is easiest to apply. To this extent, goal-directed behavior in a past, albeit unrelated situation can influence the plan that individuals select. This can occur without awareness of the factors that influenced its selection. This possibility is exemplified by the effects of *behavioral mind-sets* (Wyer & Xu, 2010).

The construct of a mind-set is widely used in social psychology (e.g., Dweck, 2006; Oyserman, Sorensen, Reber, & Chen, 2009), and the effects to which it is applied are often indistinguishable from the effects of knowledge accessibility in general. In this chapter, we restrict the use of the term to the effects of procedure-related concepts that are activated in the course of goal-directed activity on the behavioral *decisions* that are made in the course of pursuing a later, quite different objective without awareness of the reason for doing so. Thus, the effect of a mind-set is distinguished from the effects of activating semantic concepts and knowledge on the interpretation of information (Bargh & Pietromonaco, 1982; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1979), judgments of a proposition's validity (Wyer & Hartwick, 1980, 1984), or predictions and explanations. Moreover, its effect is distinguished from the effects of productions, which elicit behavior automatically in the absence of a conscious decision to perform the behavior. Thus, behavioral mind-sets play a unique role in goal-directed cognitive behavior. Research in three areas—communication and persuasion, counterfactual thinking, and decision making—is illustrative.

## 2.1. Counterarguing and bolstering mind-sets

When individuals have little interest in the topic of a communication, they might simply comprehend the message without thinking carefully about the validity of its claims. When they are more motivated to think about its implications, however, they might often elaborate on its implications, based on their prior knowledge about the topic. Alternatively, they might attempt to refute the assertions contained in it. When individuals do not have a strong attitude toward the topic of the message they receive, their decision to engage in these alternative processes could be influenced by recent experiences they have had before the information is encountered. The processes that theoretically mediate this influence are similar to those described earlier in this chapter. Xu and Wyer (2012) provide a compelling demonstration of this possibility.

### 2.1.1. Responses to advertisements

Participants in one study were first asked to list their thoughts about each of three propositions. In one condition, the propositions were worded in such a way that led participants to agree with them (e.g., “Reading enriches the mind,” “The University of Illinois should not increase tuition fees,” etc.). In a second condition, they were worded in a way that led participants to disagree with them (e.g., “Reading is bad for the mind,” “The University should increase tuition fees,” etc.). Thus, although the thoughts that participants listed had similar implications in each condition, they were likely to induce a “bolstering” mind-set in the first case but a “counterarguing” mind-set in the second. In a third, control condition, participants listed thoughts about evaluatively neutral propositions.

After completing their thought listings, participants read an advertisement for a vacation spot as part of an ostensibly unrelated study and evaluated its desirability along a scale from 0 to 10. Participants evaluated the vacation more favorably when they had listed supportive thoughts in the priming task ( $M=6.80$ ), and less favorably when they had listed counterarguments ( $M=4.94$ ), than they did in control conditions ( $M=6.22$ ).

Further studies identified two contingencies in this conclusion. First, inducing a bolstering or counterarguing mind-set is likely to have little effect if the processes governed by this mind-set are elicited spontaneously by the message itself. This could explain the relatively small effect of a bolstering mind-set in the first study. In a second study, the advertisement promoted the desirability of exotic Chinese cuisine, featuring scorpions and seahorses that western participants were likely to counterargue on *a priori* grounds. In this case, inducing a bolstering mind-set had a significant effect ( $M=5.77$ ) relative to control conditions ( $M=3.97$ ), but the effect of a counterarguing mind-set was negligible ( $M=3.86$ ).

Second, inducing a counterarguing mind-set is likely to decrease the impact of a message only if the arguments contained in the message are easy to refute. If the message is difficult to refute, inducing this mind-set could increase individuals' sensitivity to its persuasiveness and consequently might have a boomerang effect. A third study confirmed this possibility. Participants in this study were first primed to bolster or counterargue using the same procedure described in the previous study. Then, they were exposed to a charitable appeal from UNICEF. The legitimacy of this appeal was difficult to refute. In this case, inducing a counterarguing mind-set *increased* the effectiveness of the appeal relative to control conditions.

### 2.1.2. Responses to political debates

The mind-sets in the preceding studies were induced by asking participants to list their thoughts about opinion statements. Mind-sets can also be induced by exposing participants to messages that spontaneously elicit different cognitive responses. To demonstrate this possibility, Xu asked persons to listen to a segment of a speech by Barack Obama on his economic policy, a comparable speech by John McCain, or a debate between the two candidates. After doing so, they responded to an ad for Toyota. When individuals had strong preferences for one of the candidates, they were expected to spontaneously elaborate positions expressed by their preferred candidate and to counterargue the position advocated by the opponent. Consistent with expectations, self-professed Republicans and Democrats both increased their evaluations of Toyota after hearing a speech by their own party's candidate but decreased their evaluations after hearing a speech by the opponent. However, participants with no *a priori* interest in either candidate were expected to respond differently. These participants elaborated the content of the speech regardless of which candidate delivered it. However, independents who listened to the debate apparently followed the candidates' attacks on one another's positions and developed an implicit counterarguing mind-set. Consequently, they counterargued more and were less influenced by the Toyota ad than were either participants who had heard speeches or control participants.

## 2.2. Counterfactual reasoning mind-sets

The generation of counterfactuals requires a consideration of reasons why an event might not have occurred. To this extent, it might induce a mindset that increases the likelihood of considering alternative possibilities in a later situation. As a result, it might decrease confidence in one's predictions of what might actually happen in this situation. [Hirt, Kardes, and Markman \(2004\)](#) found that after participants had generated alternative hypotheses concerning which TV sitcom would win a "best program" award, they reported less strong beliefs that a favored basketball team would win the

NBA championship. Analogously, [Kray and Galinsky \(2003\)](#) found that inducing a counterfactual thinking mind-set led participants to recognize the disadvantages of pursuing a very attractive goal rather than considering only its advantages.

If counterfactual thinking induces a disposition to consider alternative courses of action, it could facilitate problem solving. Participants in a study by [Galinsky and Moskowitz \(2000\)](#) read a series of scenarios that stimulated them to imagine what might have occurred if a course of action had not been taken. This activity increased their likelihood of solving a creativity task that required recognition of the fact that an object can serve multiple purposes (e.g., that a box of tacks can be used as a base for mounting a candle as well as a container).

### 2.3. Behavior decision making

Goal-directed processing typically involves a series of decisions. First, people decide *whether* to pursue an objective rather than to maintain the status quo (e.g., whether to go out on a date or stay at home). Then, if several options are available, they decide *which* option they prefer (e.g., whom to ask). Finally, they decide *how* to implement their choice (how to entice the proposed dating partner to accept the invitation, etc.). If the general concepts associated with processing at a particular step in the sequence have become accessible in memory as a result of goal-directed processing in a previous situation, exemplars of these concepts may be activated and applied in other situations to which they are applicable.

Evidence of this generalizability was obtained by [Gollwitzer and his colleagues \(Gollwitzer & Bayer, 1999; Gollwitzer et al., 1990; Henderson, de Liver, & Gollwitzer, 2008\)](#). [Henderson et al. \(2008\)](#), for example, found that individuals who considered whether they would pursue a particular objective (which presumably required a consideration of both positive and negative consequences of the proposed action) reported more uncertainty about the judgments they made in a later situation than individuals who had considered how they would pursue the objective.

#### 2.3.1. Shopping momentum

Individuals who have consciously decided to attain a goal have necessarily activated concepts associated with its implementation. This may give rise to an “implemental” mind-set that leads them to pursue objective in a later situation without considering whether they actually want to do so. In a study by [Dhar, Huber, and Khan \(2007\)](#), participants at the start of an experiment were given an opportunity to purchase a pen for either a low price or a high one. They typically bought the pen in the first condition but not in the second. They were later given a chance to buy a moderately expensive key chain. Participants were more likely to purchase the key

chain if they had decided to make a purchase earlier than if they had refused. Thus, a positive purchase decision induced an implemental mind-set that participants reapplied later without performing the earlier deliberative (whether-to-buy) stage of processing.

### 2.3.2. Comparative-judgment mind-sets

Stating a preference for one of a set of alternatives presumably activates concepts associated with the second, "which-to-choose" step of decision making. These concepts, once accessible, could lead individuals to perform this second step in a later decision situation without performing the first, "whether-to-choose" step. As a consequence, they might be more likely to choose one of the alternatives available in the second situation without considering the possibility of choosing nothing at all.

Xu and Wyer (2007) obtained evidence of this in a product choice situation. In one study, some participants were given descriptions of five pairs of options (restaurants, elective courses, etc.) and were asked in each case to report their preference for one of the alternatives. After the experiment, both these participants and others who had not performed the preference task were given an opportunity to buy one of the two types of candies that were on sale at half price. As expected, 28% of the participants who had performed the preference task purchased candy, whereas only 6% of the control participants did so.

A second set of studies (Xu & Wyer, 2008) confirmed further implications of these findings and suggested that making almost *any* sort of comparative judgment was sufficient to induce a which-to-choose mind-set. For example, participants' willingness to purchase one of the two computers in a hypothetical choice situation was increased not only by asking them which of the two vacation packages they would prefer but also by asking them which of the packages they *disliked* more.

A final series of studies (Xu & Wyer, 2008) confirmed the generalizability of a which-to-choose mind-set over content domains. In one study, participants in *preference-judgment* conditions were exposed to 10 pairs of wild animals (an elephant vs. a hippopotamus, a kangaroo vs. a zebra, etc.) and indicated which animal they preferred. Participants in *attribute-judgment* conditions were asked to compare the animals with respect to a particular attribute (i.e., "Which is heavier, an elephant or a hippopotamus?," "Which can run faster, a kangaroo or a zebra?," etc.). These participants, along with control participants who were not exposed to either task, were given descriptions of two computers, X and Y, and reported their willingness to purchase X, Y, or neither. A second study was similar except that in this case, participants were given personality trait descriptions of two persons and were asked if they would be willing to have one, the other, or neither as a dating partner. Finally, participants in a third study were given an opportunity to purchase one of a number of products (candy, chips, etc.) that had

been ostensibly used as incentives in other experiments and were on sale at half price.

The effects of making initial comparative judgments, shown in Table 5.1, were similar in all cases. That is, participants were more likely to choose one of the alternatives described in the target task if they had either reported their preferences for animals or compared them with respect to a physical attribute than under control conditions, and this was true regardless of whether the alternatives pertained to products or dating partners. Moreover, participants' likelihood of actually purchasing a product after the experiments showed an identical pattern.

The generality of a comparative-judgment mind-set and its impact on actual purchase decisions raise an interesting speculation. That is, the consumption of material goods may be greater during election years, when citizens are continually being asked which of two political candidates they prefer, than in off-election years. Preliminary data bearing on the latter speculation are suggestive. An analysis of the U.S. personal consumption expenditures between 1929 and 2002 (converted to real 1996 dollars) revealed that the average expenditure during presidential election years was 2.2% greater than the average expenditure in the years immediately preceding and immediately following them (\$2458 billion vs. \$2406 billion). Furthermore, the retail store sales during 3 months prior to the election (August, September, and October) were 9.4% higher during the election years between 1953 and 2000 than it was during comparable periods of the years before and after the election. Although these differences are not statistically significant, their consistency with expectations is provocative.

## 2.4. Variety seeking mind-sets

Individuals often have occasion to choose several articles of a given type for use over a period of time. Grocery shoppers, for example, often stock up on items for use over several days in order to avoid numerous trips to the store. Vacationers might select a number of books to read. In such situations,

**Table 5.1** Effects of reporting preferences for animals and comparing their physical attributes on purchase decisions and dating partner choices (based on data from Xu & Wyer, 2008)

	Preference judgment	Attribute judgment	Control
Likelihood of choosing product	0.64	0.68	0.40
Likelihood of choosing dating partner	0.75	0.70	0.47
Likelihood of making an actual purchase	0.51	0.52	0.37

individuals are sometimes inclined to select the same type of item (e.g., the type they prefer most) for use on each occasion. In other cases, they choose a variety of items. These different strategies can often depend on the type of item being considered. In some cases, however, their disposition to choose variety may depend in part on factors that have induced them to make the same or different responses repeatedly in a previous situation.

Experiments by Shen (Shen & Wyer, 2010) supported this conjecture. Participants first answered a series of questions about four animals (a dog, a tiger, a chicken, and a pig). In *different-choice* priming conditions, the answer to each question differed (“Which animal is largest?,” “Which animal is most loyal?,” etc.). In *same-choice* priming conditions, the answer to each question was the same (“Which animal is largest?,” “Which animal is most ferocious?,” etc.).

After completing this task, participants as part of an ostensibly different experiment were told to assume that they were shopping for herbal tea and to indicate which of four brands they would choose to drink on each of the next 4 days. The number of different choices was significantly greater when participants’ answers to the questions in the first task had been different ( $M=2.90$ ) than when they had been the same ( $M=2.25$ ). In a second set of conditions, however, participants before making their choices completed a short questionnaire that called their attention to the number of different choices they had made in the first task. Participants’ consciousness of their past behavior apparently broke the mind-set that was activated in the absence of awareness. Consequently, the number of different choices they made did not depend on whether they had made the same or different responses to questions in the first task (2.63 vs. 2.80, respectively).

## 2.5. Motivation-induced mind-sets

### 2.5.1. Acquisition mind-sets

Although mind-sets can be induced by external stimulation, they may also result from internal stimulation. For example, hungry individuals are likely to make favorable evaluations of food, which would presumably satisfy their hunger. At the same time, their thoughts about acquiring food might activate a more general disposition to *acquire* food (e.g., an acquisition mind-set) that, once activated, might generalize to stimuli, in general, regardless of the motivation that gave rise to its activation.

Studies by Xu (2010) support this possibility. In an initial study, participants took part in the study at either 2 pm (after lunch) or 6 pm (shortly before dinner). Then, some participants were given a list of food and nonfood items with instructions to report the favorableness of their reactions along a scale from  $-5$  (very unfavorable) to  $5$  (very favorable). Others were asked to indicate how much they would like to *have* the items along a scale from  $0$  (not at all) to  $10$  (very much). As shown in Table 5.2, hungry

**Table 5.2** Ratings of food and nonfood items as a function of hunger and achievement motivation

	Favorableness ratings		Desire to acquire	
	Food items	Nonfood items	Food items	Nonfood items
Hungry participants	1.91	2.58	5.98	7.25
Nonhungry participants	1.33	2.68	5.68	6.57
$M_{\text{diff}}$	0.58	-0.10	0.30	0.68

participants rated food more favorably than nonhungry participants did, but their ratings of nonfood items did not differ. If thinking about acquiring food induces an acquisition mind-set, however, it should be in a disposition to acquire both types of products. Consistent with these expectations, hunger significantly increased participants' desire to acquire both food and nonfood items.

Note that if the impact of hunger in this experiment were attributable to motivational factors, the effect should be eliminated when participants' hunger is satiated. To examine this possibility, hungry and nonhungry participants (again inferred from the number of hours they had gone without eating) were asked to indicate the desirability of acquiring the food and nonfood items employed in the first experiment. In some cases, however, the hungry participants were given a blind taste test in which they sampled 10 brands of crackers. These participants' hunger was significantly reduced relative to that of hungry participants who had not performed the taste test (2.97 vs. 6.57, respectively) and was nonsignificantly less than that of nonhungry participants ( $M=3.91$ ). Nevertheless, both hungry and satiated participants reported a greater desire to acquire stimulus items than control participants did, and this was true for both food items (5.85, 6.14, and 5.13, for hungry, satiated, and control participants, respectively) and nonfood items (6.31, 6.41, and 6.04, respectively). Thus, the motivation to attain a particular objective (i.e., to satisfy hunger) activated a more general, acquisition mind-set that affected acquisition responses independently of this motivation and that persisted even after the motivation had been satisfied.

### 2.5.2. Promotion and prevention mind-sets

When a decision is likely to have both positive and negative consequences, it is likely to depend on which set of consequences is weighted more heavily. Differences in the emphasis placed on the positive and negative consequences of a behavioral decision are evident in research on regulatory focus (Higgins, 1997, 1998). These differences may have motivational roots.

Once the promotion or prevention motive is activated, however, it can induce a mind-set that influences decisions in situations that are unrelated to those that gave rise to their activation.

In a study by [Briley and Wyer \(2002\)](#), for example, participants were induced to think of themselves either as part of a group or as individuals while they performed an initial experimental task. In another condition, both Asian and European-American participants were exposed to icons of either their own culture (thus calling attention to their identity as a member of this cultural group) or a different culture. In each case, individuals' feelings of group membership were expected to increase concern about others' reactions to one's behavior and, therefore, to induce a prevention mind-set. Consistent with this expectation, inducing participants' perceptions of membership in both an experimentally constructed group and a cultural group led them to make decisions that minimized the likelihood of negative consequences in situations to which their group membership was irrelevant. (For example, they were more likely to choose an option whose values were +1 and -1 along two attribute dimensions than an option whose values were +3 and -3.)

Chronic differences in promotion and prevention mind-sets can exist as well. Asians are disposed to be more prevention focused than Westerners as a result of socialization practices that differentially emphasize these orientations ([Miller, Fung, & Mintz, 1996](#); [Miller, Wiley, Fung, & Liang, 1997](#)). However, the effects of these orientations may not always be apparent. [Briley, Morris, and Simonson \(2000\)](#) found that East Asians were more likely than North Americans to choose options that minimized the negative consequences of their decision, but only if they were asked to give a reason for their choice. Later studies ([Briley, Morris, & Simonson, 2005](#)) showed that bicultural Chinese participants were more likely to choose options that minimized the negative consequences of their decision if the experiment was conducted in Chinese than if it was conducted in English. In both studies, therefore, situational factors that called participants' attention to culture-related norms and values were necessary in order to activate the prevention and promotion mind-sets that influenced their choice behavior.

### 2.5.3. Uncertainty avoidance mind-sets

Suppose individuals are confronted with a choice of either (a) receiving \$150 with 0.5 probability or (b) receiving \$150 with an unknown probability that could vary between 0 and 1. The expected likelihood of winning is the same in both cases. Nevertheless, individuals with a disposition to avoid uncertainty are inclined to prefer "a" over "b." A series of studies by [Muthukrishnan, Wathieu, and Xu \(2009\)](#) demonstrated that inducing this disposition activates an "uncertainty-avoidance" mind-set that generalizes to other, quite different decision situations. In one study, for example, participants were first asked to make a series of gambles. In one condition,

the payoff probability of both choice options was unambiguous. In a second, one payoff probability was uncertain, inducing individuals to avoid this alternative. After performing this task, participants as part of an unrelated experiment were asked their preference for (a) a product from an established company with inferior attributes and (b) a product from an unknown company with superior attributes. Only 49% of participants in the first condition opted for the established brand with inferior attributes. However, 64% of the participants in the second condition did so. Thus, the disposition to avoid uncertainty in one situation generalized to other, unrelated situations that participants encountered subsequently.

#### 2.5.4. Summary

The preceding studies exemplify the wide range of phenomena that can be accounted for in terms of a mind-set construct. There are nonetheless boundaries on the construct's applicability. Most obviously, a behavioral mind-set is only likely to govern the use of goal-directed procedures that are both applicable to the goal being pursued and easy to apply. Moreover, if participants become aware that the decision strategy that comes to mind is a result of irrelevant situational factors that have nothing to do with the goal being pursued, they may avoid using it (Shen & Wyer, 2010). Nevertheless, the diversity of situations in which behavioral mind-sets come into play is worth noting.

### 3. THE EFFECT OF PRODUCTIONS I: ATTENTION AND INFORMATION SEEKING

The effects of behavioral mind-sets on judgments and decisions are likely to be mediated by the deliberate consultation and use of declarative knowledge. In contrast, the impact of past behavior on attention, comprehension, and response generation is often mediated by productions that are applied automatically, without awareness. In this and the following sections, we review studies bearing on this possibility.

Individuals are often called upon to make a generalization about a group of stimuli on the basis of information about its individual members. For example, they might estimate a student's academic performance on the basis of his grades over several semesters, or might infer the cost of eating at a restaurant by scanning a menu in the window. However, they may often not have the time or motivation to consider all of the information available. In this case, their judgments may depend on the strategy they use in conducting their search.

In many instances, individuals simply construe the implications of the information in the order in which they receive it. However, other strategies

could also be used. For example, restaurant customers might sometimes identify and evaluate high prices before they consider low ones. At other times, they might attend to the low-priced items first. These alternative search strategies can often be employed with little if any cognitive deliberation. To this extent, they might be governed by productions that are activated and applied spontaneously, without awareness.

A series of studies by [Shen and Wyer \(2008\)](#) confirmed this possibility. Participants in first study were given sets of four product attributes with instructions to rank order the attributes in each set either from most to least favorable or from least to most. Ranking from most to least requires a consideration of favorable attributes before unfavorable ones, whereas ranking from least to most requires a consideration of unfavorable attributes first. In a second study, participants received the same sets of attributes as in the first experiment with instructions to indicate either if they would choose the product described or, in a second condition, whether they would reject it. People typically focus on favorable attributes of a choice alternative if they are asked whether they would choose it but focus on unfavorable attributes if they are asked whether they would reject it ([Shafir, 1993](#)). Thus, both procedures were expected to activate a disposition to process information in different orders depending on the condition to which they were assigned.

Participants in both experiments were then given descriptions of a computer containing 10 attributes that varied in favorableness and were told that they would have either 15 s or as much time as they wanted to evaluate it. The results of both studies, shown in [Table 5.3](#), are quite consistent. That is, when participants did not have enough time to process all of the information they received, they evaluated the computer more favorably when the search strategy they had applied in the initial task had disposed them to consider favorable pieces of information before unfavorable ones. When they had as much time as they wanted, however, participants appeared to give greater weight to the last attributes they considered (the ones they had processed more recently), which were more accessible in memory. Consequently, they evaluated products *less* favorably when the initial task disposed them to consider the favorable attributes first.

**Table 5.3** Product judgments as a function of attentional priming task and judgment time (based on data from [Shen & Wyer, 2008](#))

Judgment time	Ranking task (Experiment 1)		Evaluation task (Experiment 2)	
	High-to-low	Low-to-high	Choose	Reject
15 s	5.80	4.64	3.64	3.27
Unlimited	4.67	5.68	3.94	4.63

Later studies showed that the effects observed in this study generalized not only over different types of stimuli but also different types of judgments. For example, the procedure of rank ordering a set of student examination scores influenced participants' later evaluations of a product on the basis of a list of individual consumers' ratings. An additional experiment separated the effects of content and the effects of the procedure that operated on this content. Participants first rank ordered the prices of 10 hotels in each of three cities either from highest to lowest or from lowest to highest. In some cases, however, all of the prices they ranked were generally moderate, whereas in other cases, the prices were all relatively high. Participants after making these rankings were given a list of 24 other hotels and asked to estimate their average cost along a scale from 0 (not at all expensive) to 10 (very expensive). However, the prices were listed either in descending order (from highest to lowest) or in ascending order (from lowest to highest).

As Table 5.4 indicates, the price of the hotels that participants considered in the priming task had a negative, contrast effect on their price estimates in the second task. Participants appeared to use the initial prices they considered as a standard of comparison in assessing the expensiveness of the prices they encountered later.

However, the production that participants activated in the course of performing the ranking task had an impact that was independent of this "content" effect. That is, participants estimated the average price of the hotels to be higher if they had previously ranked prices from high to low than if they had ranked them from low to high. In interpreting this effect, it is worth noting that after the experiment, 78% of the participants reported that they had attended to the first prices in the list before considering later ones. In fact, however, the order in which prices were listed had no effect whatsoever on their price estimates. Thus, the production that was activated in the course of performing the rank-ordering task apparently affected their attention to prices in the second task without awareness.

**Table 5.4** Price estimates of target hotels as a function of the prices presented in the priming task, ranking procedure, and target presentation order (based on data from Shen & Wyer, 2008)

	High prices primed	Moderate prices primed	<i>M</i>
<i>High target prices listed first</i>			
High-to-low ranking task	4.62	5.91	5.27
Low-to-high ranking task	4.00	5.25	4.62
<i>M</i>	4.31	5.58	
<i>Low target prices listed first</i>			
High-to-low ranking task	5.18	6.27	5.72
Low-to-high ranking task	4.45	4.92	4.89
<i>M</i>	4.81	5.60	

## 4. THE EFFECT OF PRODUCTIONS II: COMPREHENSION

People can apply a number of different strategies in comprehending information. For example, they could encode information in terms of concrete concepts or more general ones (Förster & Dannenberg, 2010; Liberman, Trope, & Stephan, 2007); they might encode information semantically or form visual images of its referents (Kosslyn, 1976); they might interpret individual items of information independently or in relation to one another and the context in which they are found (Nisbett, 2003). These strategies can depend in part on the type of information to be comprehended and in part on demands of the task at hand. In some cases, however, the comprehension strategy that individuals bring to bear on the processing of information may be fairly arbitrary. To this extent, the comprehension procedure that is employed can be influenced by the strategy that was used for a different purpose in an earlier, quite different situation.

Research on comprehension processes has not often distinguished between the conscious selection of a processing strategy and the use of a production (but see Wyer & Radvansky, 1999). Consequently, which cognitive system mediates the selection of a particular comprehension strategy can often only be speculated. Nonetheless, research in several areas provides evidence of the impact of goal-directed comprehension in one situation on the procedure that is spontaneously applied in a quite different situation. These areas concern (a) the encoding of information visually or verbally, (b) the interpretation of information in terms of abstract concepts or specific ones, (c) the treatment of individual pieces of information as separate entities or a consideration of their relation to one another, and (d) categorization processes.

### 4.1. Visual versus verbal information processing

Individuals may automatically encode input information in the modality in which they receive it (Wyer & Radvansky, 1999). That is, they may encode verbal information in terms of semantic concepts and knowledge, and encode pictorial information in terms of visual images. This encoding may often be sufficient to comprehend it without further processing (Wyer, Adaval, & Colcombe, 2002). In many cases, however, a recoding of the information may be necessary in order to attain a more specific objective to which the information is relevant. Moreover, the production-based procedure that is spontaneously applied to information can sometimes be unsuccessful. In each case, individuals may then resort to more deliberative, goal-directed comprehension processes.

However, deliberative processing can often be detrimental. For one thing, this processing can conflict with processes that are governed by a production.

Furthermore, deliberative comprehension processes require cognitive effort, and this decrease in processing fluency can lead to less favorable reactions to the object to which the information pertains (Schwarz, 1998, 2004; see also Winkielman & Cacioppo, 2001; Winkielman, Schwarz, Fazendeiro, & Reber, 2003). (Thus, for example, information has less impact on judgments if it is presented in a difficult-to-read font; Novemsky, Dhar, Schwarz, & Simonson, 2007; see also Shen, Jiang, et al., 2010.) Research on the determinants and consequences of verbal and visual comprehension processes exemplifies these effects.

#### 4.1.1. Interference effects of processing strategies

If the processes that are governed by a production and those that are involved in deliberative, goal-directed activity are incompatible, they may interfere with one another, decreasing the effectiveness of both. Schooler and his colleagues (Dodson, Johnson, & Schooler, 1997; Schooler & Engstler-Schooler, 1990) provide evidence of this interference. In a particularly important study (Dodson et al., 1997), participants were first exposed to a series of faces, the comprehension of which presumably activated a visual processing strategy. Then, they were asked to describe one of the faces verbally. Generating this description increased participants' later recognition of not only this face but also other faces they had seen but had not described verbally. Verbally encoding the face in the course of describing it apparently activated a verbal processing strategy that interfered with the visual processing that was necessary for accurate face recognition. Furthermore, this processing interference generalized to faces other than the one to which the verbal encoding strategy had been applied.

#### 4.1.2. Effects on ease of processing

Although the productions activated by concepts employed in performing a previous task may be applied spontaneously in a new situation, conflict can arise if the information to which they are applied cannot easily be comprehended by using them. Studies by Jiang, Steinhart, and Wyer (2010; see Wyer, Hung, & Jiang, 2008) exemplify this possibility. In these studies, a verbal or visual processing strategy was induced by asking participants to perform either a hidden-word task (which required the identification of words that were embedded in an array of letters) or a hidden-figures task (which required the identification of geometrical shapes that were embedded in a picture). After performing this task, participants evaluated a computer mouse on the basis of verbal descriptions of its attributes. The attribute descriptions were the same in all cases. In some conditions, however, they allegedly pertained to a standard optical mouse of the sort that most college students used on a daily basis. In other conditions, they ostensibly pertained to a "trackball" mouse that is typically used only by graphic designers and was unfamiliar to participants.

All participants presumably comprehended the attribute descriptions verbally at the time they read them. However, performing a visual processing task activated a disposition to form a visual representation of the object containing the features described. When the mouse was familiar, this was easy to do. When the mouse was unfamiliar, however, a previously formed image of it did not exist. Consequently, the construction of a visual representation of it was difficult, and this difficulty produced a decrement in evaluations of the mouse for reasons suggested by Schwarz (2004) and others (Winkielman et al., 2003). Thus, as shown in the top half of Table 5.5, individuals with a disposition to process the information visually evaluated the trackball mouse less favorably than the standard one (3.63 vs. 5.02, respectively). In contrast, individuals who had performed a verbal processing task in the first situation did not attempt to form visual images and evaluated the familiar and unfamiliar products similarly (5.00 vs. 5.02).

These considerations also imply that if a picture of the unfamiliar product is presented, it should have a greater effect on individuals who are disposed to process information visually but should have little effect on those who are inclined to process information verbally. Data presented in Table 5.5 confirmed this possibility as well. That is, presenting a picture increased visual information processors' evaluations of the unfamiliar product (from 3.63 to 5.21) but had little effect on their evaluations of the familiar one (5.02 vs. 5.33). In contrast, the presence of a picture actually decreased verbal processors' evaluations of the unfamiliar product (from 5.02 to 4.08), suggesting that the picture interfered with their processing of the verbal descriptions.

As we noted earlier, the activation and use of a production could be influenced by its chronic accessibility. Further research by Jiang and his colleagues supported this possibility. In two studies paralleling those described in the preceding section, Jiang et al. (2010) assessed differences

**Table 5.5** Mean product evaluations as a function of product familiarity, the presence of a picture, and processing strategy (based on data from Jiang et al., 2010)

	No picture		Picture	
	Visual strategy	Verbal strategy	Visual strategy	Verbal strategy
<i>Experiment 1: situationally activated strategy</i>				
Familiar mouse	5.02	5.00	5.33	5.82
"Trackball" mouse	3.63	5.02	5.21	4.08
<i>Experiment 2: chronic strategy</i>				
Familiar mouse	4.52	4.57	5.22	5.45
"Trackball" mouse	2.97	4.78	4.17	3.74

in the disposition to process information visually or verbally using Childers, Houston, and Heckler's (1985) Style of Processing Scale. As conveyed in the bottom half of Table 5.5, the effects of chronic dispositions to engage in visual or verbal processing were virtually identical to the effects of situationally induced dispositions.

#### 4.1.3. Perspective effects on visual processing

Visual images, like pictures, are formed from a particular perspective. Chronic visual information processors may form a visual image of the situation described by a verbal statement in the course of comprehending it. However, if statement elicits an image from an unfamiliar perspective, they may find the statement difficult to comprehend. To investigate this possibility, participants in a study by Jiang and Wyer (2009) were shown a series of statements on a computer with instructions to indicate by pressing a designated key on the keyboard whether each statement was comprehensible or not. Four of the statements referred to a person (a) going into the men's room, (b) going into the ladies' room, (b) coming into the men's room, or (d) coming into the ladies' room. A visual image of the events described by the first two statements would presumably be formed from the perspective of someone outside the room, whereas an image of the events described by the second two statements would be formed from the perspective of someone inside.

Images of individuals going into a restroom are presumably familiar to all participants regardless of the type of room it is. Consistent with this assumption, males and females with a disposition to form visual images did not differ in the time they took to comprehend statements that described someone going into a restroom regardless of the type of room described. However, male imagers took significantly longer to comprehend a statement that a person came into the ladies' room ( $M=2.62$  s) than a statement that someone came into the men's room ( $M=2.00$  s). In contrast, female imagers took significantly less time to comprehend the first statement than the second (2.23 vs. 2.62 s). Individuals with a disposition to process information verbally, however, did not differ in the time they took to comprehend the two types of statements.

A second study showed the effects of chronic visual and verbal processing dispositions on judgments. People are likely to have more extreme emotional reactions to an event if they are present in the situation in which the event occurs. Consequently, they should have more extreme reactions to events that they *imagine* from the perspective of someone in the situation described. To this end, Jiang and Wyer (2009) asked participants to read and comprehend descriptions of positive or negative events that were written from the perspective of either someone in the situation (e.g., "The actress came into the room and sang a beautiful song," "The drunk came into the kitchen and threw up on the floor," etc.) or someone outside ("The actress

went. . . ,” “The drunk went. . .”) and, in each case, to rate the favorableness of their reactions to the event described.

These reactions are summarized in Table 5.6. Chronic imagers reported more extreme reactions to events when they were described from the perspective of someone in the situation than when they were described from the perspective of someone outside. In contrast, chronic nonimagers reported similar reactions regardless of the perspective from which the statements were written.

#### 4.1.4. A note of caution

Our interpretation of these findings assumes that visual and verbal comprehension processes are governed by productions that are spontaneously applied to the information at hand. However, although the processes may be performed automatically, it is unclear from the preceding studies whether the *activation* of the processes occurred automatically or, alternatively, participants consciously decided to employ them. Fortunately, the role of productions in other comprehension processes is less equivocal.

## 4.2. Level of abstractness

The concepts used to comprehend information can vary in abstractness. A pet, for example, might be encoded as “Rover,” a “collie,” a “dog,” or an “animal.” Similarly, an event might alternatively be interpreted as “buying meat and eggs” and “getting groceries.” There are basic levels of abstractness at which objects and events are spontaneously encoded (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). It, nevertheless, seems likely that the encoding of information at a given level of abstractness in one situation could induce a disposition to encode information conveyed in a later situation at the same level. This encoding could affect both memory for the information and the implications that are drawn from it.

**Table 5.6** Reactions to favorable and unfavorable event descriptions as a function of the perspective from which the events are described and chronic disposition to form visual images (based on data from Jiang & Wyer, 2009)

	Visual processing disposition		Verbal processing disposition	
	Favorable descriptions	Unfavorable descriptions	Favorable descriptions	Unfavorable descriptions
Inside perspective	2.92	-3.92	2.19	-2.31
Outside perspective	2.42	-3.05	2.25	-2.64
$M_{diff}$	0.50	-0.87	-0.06	0.33

The determinants and effects of difference in the abstractness of the concepts used to interpret information have been examined in the context of the construal-level theory (Liberman et al., 2007; Trope & Liberman, 2003; Trope, Liberman, & Wakslak, 2007). Individuals tend to construe psychologically distant events in terms of abstract, high-level concepts (e.g., desirability) but to construe proximal events in more concrete, context-specific terms. These dispositions appear to be similar regardless of whether the dimension of psychological distance is temporal, geographical, or social. As Förster and Dannenberg (2010) suggest, this difference could reflect a more fundamental difference in the amount of knowledge that one has about these referents. That is, people typically have less information about psychologically distant persons and events than about proximal ones, and the information they have is likely to be less detailed. Because of this general difference, they may acquire a learned disposition to characterize distal stimuli abstractly or globally (and proximal stimuli in more detail) that becomes *independent* of the amount of information they actually have acquired about the stimuli. Such a disposition could be reflected in the use of a production that is activated by features of a referent and the situational context in which they occurred and is applied with little if any cognitive mediation.

If this is the case, the production that is activated by construing events at different levels of psychological distance in one situation might be reelicited and applied to information that is encountered later. Furthermore, these effects might generalize to situations in which psychological distance is not itself involved. Förster, Friedman, and Liberman (2004) found that individuals performed relatively better on tasks that required the abstraction of global images from a noisy input if they imagined working on the task in the distant future. Apparently, simply imagining oneself performing a task at different points in time induced a disposition to construe events in terms of abstract or concrete concepts that influenced their task performance in quite unrelated situations.<sup>1</sup>

### 4.3. Holistic versus piecemeal comprehension

The interpretation of information in terms of abstract rather than situation-specific concepts may reflect a more general disposition to comprehend a cluster of information items as a whole rather than focusing on its individual

<sup>1</sup> There are, nevertheless, some constraints on this conclusion. A series of studies by Zhang and Wang (2009) showed that individuals who were stimulated to construe events that were either physically distant or near tended to make correspondingly distant or near judgments along other dimensions (temporal, social, or probabilistic) in a later experiment. However, the reverse was not true; the abstractness of concepts employed along the latter dimensions influenced the abstractness of concepts used along the same dimension but did not generalize to other dimensions at all. As the authors suggest, the concepts of temporal, social, and probabilistic “distance” are metaphorical, and these metaphorical meanings may be activated by differences in physical (nonmetaphorical) distance. However, differences in metaphorical meaning are less likely to activate differences in nonmetaphorical meaning.

elements. The determinants and effects of this disposition are discussed in detail by Förster and Dannenberg (2010) in a review and analysis of “global” versus “local” processing. In this research, differences in this processing are exemplified by differences in responses to a large stimulus that is composed of numerous smaller ones (e.g., a large letter that is formed from a configuration of small letters of a different type; see Navon, 1977). Förster (in press) found that inducing participants to employ global versus local processing in one sensory domain (e.g., visual) affected their processing in other sensory domains as well (tactile, auditory, and taste). These effects seem likely to be mediated by a production that was activated in the course of performing the first task and, once accessible, was automatically reactivated and applied in performing the second. Other research (e.g., Macrae & Lewis, 2002) has similar implications.

Dispositions to process information holistically or piecemeal can be induced in a number of ways (Förster & Dannenberg, 2010). Once they have been induced, they can have a variety of effects on how information is comprehended. Two quite different studies exemplify the diversity of these effects.

#### 4.3.1. Political information processing

Participants in a study of political judgment (Wyer et al., 1991) watched a video-taped speech by a political candidate. The content of the speech was nonpolitical but was expected to lead participants to form a global impression of the candidate rather than focusing on information details. Either immediately or 24 h later, participants heard a radio program that summarized the candidate's positions on a number of social issues that in combination conveyed either a generally liberal or a generally conservative ideology. When participants considered the politician's issue stands 24 h after the speech, the global processing disposition that participants had used to comprehend the speech was no longer activated. In this case, participants processed each issue stand independently and evaluated it in terms of its consistency with their own point of view. Thus, their evaluation of the politician was influenced by their agreement with his stands on specific issues, independently of the ideology conveyed by these stands. When participants considered the politician's issue stands immediately after hearing his speech, however, the global strategy they had used to comprehend the speech generalized to their processing of the issue stands as well. Thus, their evaluations of the candidate in this case were based on the similarity of the ideology conveyed by the issue stands to their own ideology, independently of their agreement with the candidate on specific issues.

#### 4.3.2. Creative problem solving

Participants in a study by Higgins and Chaires (1980) were initially exposed to a series of pictures each depicting a container and its contents (e.g., a plate with some candies on it). In some conditions, however, the caption

describing each picture contained the word “of” (i.e., “a plate of candies”). In other conditions, it contained the word “and” (“a plate and candies”). Thus, the first caption induced a disposition to comprehend the container and its contents as a unit, whereas the second induced a disposition to consider them as separate entities.

Participants after viewing the pictures were asked as part of a different study to solve the Düncker candle problem. That is, they were given a box containing tacks and a small candle and were told to mount the candle on a wall so that it could be lit. The problem can be solved by using the box as a base for mounting the candle and then tacking it onto the wall. To arrive at this solution, however, one must dissociate the box from its contents. The problem, therefore, was solved more quickly by participants in the “and” condition, who had been primed with a disposition to interpret a container and its contents as separate entities, than by those in the “of” condition.

It seems obvious that participants in this situation were conscious of the objective they were pursuing in the situation (solving the problem they were given). However, the specific process required to identify the solution—comprehending the contents and container as separate entities rather than a whole—was guided by a production that was applied automatically in comprehending the stimulus the materials without consciousness of the factors that led them to do so.

#### 4.4. Relational comprehension processes

Further evidence of the operation of productions at the comprehension stage of processing comes from research on the tendency to construe individual pieces of information either independently or in relation to one another and to the context in which they are found. This research indicates that the way in which people think about *themselves* (independently or in relation to other persons) affects their processing of information about physical stimuli to which their self-concepts are not at all relevant. Furthermore, the production that generates this processing can be situationally induced or can result from chronic (e.g., culture-based) dispositions to think about oneself independently or interdependently.

##### 4.4.1. Situationally induced productions

Participants in a series of studies by Kühnen and Oyserman (2002) initially performed a task that required them to circle either first person singular pronouns (“I,” “me,” etc.) or first person plural pronouns (“we,” “us,” etc.) in a passage they were reading. Using “I” led them to think about themselves as independent of others, whereas using “we” presumably led them to think of themselves in relation to other persons. Then, as part of a different study, participants were asked to study an array of 28 objects (a house,

a moon, etc.). After doing so, they were given a blank sheet of paper and asked to write the names of the objects in the positions they were shown in the array. Priming had little influence on the actual number of objects recalled. However, participants who were primed with “we” were relatively more accurate in positioning the objects in relation to one another. Thus, stimulating individuals to think about themselves either independently or in relation to others activated a production that led them to think about stimuli *in general* either independently or in relation to one another, even though the stimuli had nothing to do with individuals’ self-perceptions whatsoever.

#### 4.4.2. Chronic productions

The evidence that the productions activated by thinking about oneself independently or interdependently generalizes over stimulus domains is particularly important in light of evidence that these dispositions are often chronic. Cultural differences in these self-construals are widely recognized (Markus & Kitayama, 1991; Triandis, 1989). Specifically, East Asians typically think of themselves in relation to other members of the society in which they live, whereas North Americans are disposed to think of themselves independently of others. If these dispositions are chronic, the productions they activate may be spontaneously applied in comprehending stimuli in a number of quite different domains.

Numerous studies by Nisbett and his colleagues (for reviews, see Nisbett, 2003; Norenzayan, Choi, & Peng, 2007) confirm this speculation. For example, European-Americans, who typically construe themselves as independent, have a disposition to comprehend social stimuli in terms of their category membership, whereas Asians, who characterize themselves as interdependent, tend to comprehend stimuli on the basis of their relationship to one another (Ji, Zhang, & Nisbett, 2004). Thus, for example, European-Americans who are asked to group a man, a woman, and a baby typically place the two adults together, whereas Asians group the mother and the baby.

Asians’ chronic disposition to think relationally is also evidenced by their sensitivity to the context in which stimuli are presented. For example, Asians spend more time than Americans looking at background features of a visual display (Boland, Chua, & Nisbett, 2008) and are relatively more sensitive to changes in these features (Masuda & Nisbett, 2001). At the same time, they are relatively less likely to ignore irrelevant contextual cues in performing a perceptual task. In a particularly interesting experiment, Park, Nisbett, and Hedden (1999) asked Asian and American participants to read a series of words, each of which was presented on a separate card. In some conditions, only the word was presented on each card. In other conditions, the word was surrounded by pictures of people and objects that were irrelevant to the word’s meaning. Later, participants

were asked to recall the words they had read. One might expect the irrelevant context stimuli to be distracting and to decrease participants' attention to the words. In fact, however, Asians' recall of the words was actually *greater* when the contextual stimuli were presented. This was not true of the Americans.

#### 4.5. Spontaneous categorization processes

Research by John Bargh and his colleagues (Bargh, Chaiken, Govender, & Pratto, 1992; Bargh, Chaiken, Raymond, & Hymes, 1996) demonstrates not only that individuals have a chronic disposition to categorize information favorably or unfavorably but also that these processes can operate without conscious awareness. In this research, participants are typically asked to respond to a favorable or unfavorable word following a context word that is either evaluatively similar or evaluatively dissimilar to it. The first word is normally presented subliminally. Participants respond more quickly to the second word when it is evaluatively similar to the first, subliminally primed word than when it is evaluatively different.

Although these phenomena are typically referred to as an "automatic evaluation" effect, three findings suggest a somewhat different interpretation. First, the effect is equally strong regardless of the evaluative extremity of the words presented. Second, the effects occur even when participants are simply asked to pronounce the second word rather than evaluating it (Bargh, Chaiken, et al., 1996). Third, the effects are evident even when the first, priming word is normatively either favorable or unfavorable, but participants themselves have never seen it before and therefore do not have a previously conditioned affective response to it (Duckworth, Bargh, Garcia, & Chaiken, 2002).

The third finding is particularly important. One interpretation of the results might be that the first word simply elicits a preconditioned affective reaction that is either compatible or incompatible with the response that is elicited by the second. However, the fact that novel context stimuli have similar effects argues against this possibility. As Wyer (2004) suggested, the results seem most easily interpretable as evidence of a spontaneous *categorization* process. That is, people may have an innate *a priori* disposition to categorize stimuli as either benign (favorable) or threatening (unfavorable) that might have evolutionary roots. This disposition might affect their categorization of the first word without awareness, activating a production that either facilitates or interferes with the process of categorizing the second. These interfering effects of a previously activated production on the application of a second one may be analogous to those identified in research on processing interference cited earlier in this chapter (Dodson et al., 1997).



## 5. THE EFFECT OF PRODUCTIONS III: OVERT BEHAVIOR

Although the productions that govern the impact of past behavior are elicited automatically by features that compose their preconditions, individuals may often be aware of the consequences of applying them. That is, they know whether they have formed a visual image of an object, encoded information about it in terms of abstract concepts, or considered its features in relation to one another. However, productions can also elicit behavior of which respondents are unaware. Three quite different sets of studies exemplify this possibility. In doing so, they also bear on two more general implications of our conceptualization: (a) the effects of cognitive load on the relative influence of deliberate goal-directed processing and production-based processing and (b) the independence of the effect of a production and the desirability of the goal to which it is relevant.

### 5.1. Anchoring and adjustment

People who are asked to report a judgment along a bounded magnitude scale may often use the scale endpoints as anchors in deciding how to transform their subjective judgment into a value along this scale (Tversky & Kahneman, 1974). For example, they might first focus on the high end of the scale and then adjust downward until they arrive at a value they consider to be a plausible representation of their subjective judgment. Alternatively, they might anchor on the low end of the scale and adjust upwards. However, individuals are likely to consider a range of values along the scale to be plausible. If this is so, and if participants report the first plausible value they encounter in the course of the adjustment process, they are likely to report a higher value along the scale if they have used the high end of the scale as an anchor than if they have used the low end.

The decision to use a particular scale endpoint as an anchor could often reflect the effect of a production that is elicited by concepts activated in the course of performing an unrelated task. Participants in a series of studies by Schwarz and Wyer (1985) were asked to rank order a set of environmental issues. In some cases, they ranked them from most to least important, and in other cases, they ranked them from least to most. Two other conditions were similar except that participants ranked ordered the stimuli in terms of triviality rather than importance. Then, after performing the ranking task, participants evaluated each stimulus separately along either a scale from 0 (not at all important) to 10 (very important) or a scale from 0 (not at all trivial) to 10 (very trivial).

In combination, the aforementioned conditions compose a three-factor between-subjects design involving (a) the ranking procedure (from high to

low vs. from low to high), (b) the ranking criterion (importance vs. triviality), and (c) the dimension along which ratings were made (importance vs. triviality). Despite the complexity of the design, however, the results were very clear. Participants made higher ratings along the scale when they had previously rank ordered stimuli from high to low than when they had previously ranked them from low to high, and this was true regardless of either the ranking criterion or the rating dimension. In other words, persons who had ranked stimuli from high to low in importance later rated them both (a) as more important along a scale of importance and (b) as more trivial along a scale of triviality than persons who had ranked stimuli from low to high. Ranking the stimuli in terms of triviality had identical effects.

Thus, rating stimuli from high to low apparently created a disposition to think about high values before thinking about low ones, as in the studies of attentional processes reported by [Shen and Wyer \(2008\)](#) and described earlier. This led them to use the high end of the response scale as an anchor when reporting their ratings later, regardless of the nature of the scale they employed. Rating stimuli from low to high had analogous effects. The generalizability of the production over stimulus domains was confirmed in an additional study which showed that effects on ratings of environmental issues were affected similarly by rank-ordering qualities of a marriage partner.

The productions that govern response generation can be chronic as well as situationally induced. For example, individuals differ in their disposition to use extreme values rather than moderate values along a response scale, and this difference generalizes over stimulus domains. [Wyer \(1969\)](#) showed that participants' disposition to use the extremes of a category scale (e.g., a scale with values ranging from  $-5$  to  $+5$ ) in rating the favorableness of personality trait adjectives generalized to both (a) ratings of their own attitude toward African-Americans and (b) estimates of the attitudes conveyed by others' statements about African-Americans that they reported in a questionnaire 1 month later.

## 5.2. Effects of cognitive load

Although the behavior that is governed by a production can occur without awareness, it is normally controllable. Consequently, it can be overridden by more deliberative, goal-directed processing. This suggests that if individuals are either unable or unmotivated to engage in this conscious goal-directed activity, the impact of a production will be more apparent.

A study by [Shen, Wyer, et al. \(2012\)](#) confirmed this possibility. Participants first indicated whether or not they would participate in a number of different activities. In one form, the activities had socially desirable implications (e.g., supporting human rights, protecting the environment, etc.). In a

second form, the activities had undesirable implications (harming the country, breaking the law, etc.). Regardless of which form they were given, however, some participants were asked to circle the option they favored ("join" vs. "not join") whereas others were asked to circle the option they opposed.

When the activities in the questionnaire were desirable, participants typically chose the "join" option when they were asked to indicate which option they favored but chose the "not join" option when they were asked which option they opposed. When the activities were undesirable, participants typically chose the "not join" option when they were asked to indicate which option they favored and the "join" option when they were asked which option they opposed. Thus, participants' overt responses to the opinion items ("join" or "not join") were independent of the actual implications of their responses for the desirability of joining or not joining activities in general.

Participants after completing this survey were asked to decide whether they would like to participate in an unrelated promotion for a soft drink being offered by a foreign country. While making this decision, however, they were put under either high or low cognitive load by asking them to remember either a 12-digit number or a 2-digit number.

Participants' exposure to the original list of activities activated a general motive to participate (or not to participate). Therefore, when they were not under cognitive load, they were more likely to join the promotion if the activities they had considered were desirable than if they were not, and this was true regardless of whether they had circled the options they favored (70% vs. 46%, respectively) or the options they opposed (67% vs. 45%). When participants were under cognitive load, however, their responses were apparently guided by a production that was activated by their motor responses in the first task and was independent of the implications of these responses. Thus, they were more likely to join the promotion if they had selected the "join" option in the first task than if they had not, and this was true regardless of whether the activities they had considered were desirable (64% vs. 25%) or undesirable (61% vs. 38%).

### 5.3. Goal-directed versus production-controlled processing

If pursuing a specific objective in a situation has become associated with positive or negative affect, this affect may generalize to a more general goal concept that the objective exemplifies. Consequently, it may influence the motivation to pursue a similar goal in a later situation, and this could occur without awareness of the factors that led the goal to be perceived as desirable (Custers & Aarts, 2005). However, the behavior that individuals perform in the course of pursuing the objective could activate behavior concepts that

are part of the precondition of a production. If activated, this production might govern later behavior independently of the desirability of any objective to which it might be relevant.

To demonstrate this possibility, and Shen, Wyer, et al. (2012) asked Hong Kong Chinese participants to help evaluate a method to be used in facilitating students' pronunciation of English. On this pretense, they were given the transcript of a tape-recorded speech and read it aloud while listening to the speech being delivered. However, the speech was delivered at different rates, requiring participants to speak quickly in one condition but slowly in another. In a preliminary study, participants after performing the speech-shadowing task were asked to complete a consumer survey composed of 40 different objects and activities. However, they were interrupted after 30 s, and the number of items they had completed was used as an index of how fast they had been working. Participants completed more items if they had spoken rapidly during the speech-shadowing task than if they had spoken slowly. Moreover, although they reported awareness of the speed they had spoken, they were unaware of how rapidly they had worked on the questionnaire.

A second experiment then separated the effect of the goal that participants were pursuing from the effects of the behavior that was used to attain this goal. Before performing the speech-shadowing task, participants in this study first wrote about a happy or sad personal experience using procedures that are demonstrably effective in inducing positive and negative affect (Schwarz & Clore, 1983; see also Adaval, 2001, 2003). We expected that the affect that participants experienced would become associated with the goal of speaking rapidly or slowly and that this would influence perceptions of the desirability of the more general goal of "doing things" quickly or slowly. At the same time, the concepts associated with the *behavior* of speaking quickly or slowly should activate a production that would influence behavior in a later situation independently of the affect that had become associated with the goal.

After performing the speech-shadowing task, participants were again asked to complete the product evaluation survey. Before they did so, however, the experimenter in some conditions mentioned that they might not be able to finish, thus making the goal of working quickly salient. In this condition, as shown in Table 5.7, inducing positive affect increased participants' speed of working on the questionnaire when they had spoken quickly in the speech-shadowing task and decreased their speed of working on it when they had spoken slowly. When the goal of working quickly was not mentioned, however, participants worked more quickly on the survey when they had spoken quickly in the speech-shadowing task than when they had spoken slowly, and this was true *regardless* of the affect that had been associated with the goal of working quickly.

**Table 5.7** The number of completed questions as a function of speech conditions, affect, and goal activation (based on data from [Shen, Wyer et al., 2012](#))

Number of items answered	Goal activation		No goal activation	
	Positive affect	Negative affect	Positive affect	Negative affect
Fast speech	13.27	9.62	11.10	11.04
Slow speech	10.86	12.95	9.68	9.31
$M_{diff}$	2.41	-3.33	1.42	1.73

## 6. RELATION TO OTHER FORMULATIONS

Our conceptualization has implications for phenomena that have been the focus of other more restricted conceptualizations of social behavior. Although space precludes a detailed discussion of these implications, the relation of our conceptualization to three general formulations of social information process is worth considering.

### 6.1. Other dual-processing models of behavior

Our assumption of two processing systems is compatible with numerous other dual-processing models of judgment and behavior (for review, see [Chaiken & Trope, 1999](#)). One of the most comprehensive and well articulated of these models was proposed by [Strack and Deutsch \(2004\)](#). They postulate two processing systems analogous to the systems we postulate. One, *impulsive* system operates automatically and is governed largely by associative processes. Thus, the system directs behavior by linking perceptual stimuli to behavioral “schemata” that have become associated with the stimuli through learning. The second, *reflective* system comes into play in goal-directed processing and is governed by processes of which individuals are well aware. The operations performed by this system presumably depend on the particular goal being processed and generate judgments, decisions, and intentions through deliberative cognitive activity that is relevant to this goal.

Our conceptualization is generally compatible with this formulation. The procedures that come into play in the reflective system are stored as part of declarative knowledge and are consulted deliberately when a goal to which they are relevant is being pursued. The impulsive system, on the other hand, might consist of a number of  $[X] \rightarrow [Y]$  productions, the activation of which depends on the configuration of stimulus features that happen to impinge on the system at the time.

However, our conceptualization specifies the manner in which the two processing systems interface in the course of goal-directed processing. That is, the specific subgoals that are activated in the course of deciding to pursue an objective are governed by the reflective system postulated by Strack and Deutsch. However, the routines that are necessary to implement these decisions at a low level of processing may be governed by productions of the sort that compose the impulsive system. Thus, an experienced driver on the way to work might see a red light and initiate a behavioral routine that is necessary to stop. Recognition of the light and the decision to stop are governed by the reflective system and are represented by concepts in declarative knowledge. However, these concepts may activate a production that elicits the specific actions involved in stopping with little conscious deliberation.

## 6.2. Habits

A provocative explication of the interface of automatic and goal-directed processing was proposed by Wood and Neal (2007) in reconceptualizing the role of “habits” in information processing. They conceptualize habits as “repeated responses that come to be cued by recurring features of contexts without mediation by a cognitive representation of a goal” (Wood & Neal, 2007, p. 845). A habit is typically acquired through learning but, once acquired, can be triggered by contextual cues that have reliably accompanied its performance in the past. The authors further propose that habits can be acquired in the course of goal-directed activity but that once they are formed, they can function independently of the goals with which they were originally associated.

Although this latter contention differs from that suggested by Verplanken (2006) and Custers and Aarts (2010), it is quite compatible with the conception of a production that we propose. Like Wood and Neal, we assume that the activated features that have become associated with a behavior in the past can relicit the behavior without activating the goals to which it is directly applicable. The aforementioned study by Shen, Jiang, et al. (2010) and Shen, Wyer, et al. (2010) confirms this possibility.

However, Wood and Neal’s conception of a habit is at a more abstract level than that at which a production operates. Ji and Wood (2007), for example, provide several examples of situations in which individuals’ actual behavior is inconsistent with their reported intentions to engage in this behavior. However, the behaviors they consider (e.g., taking the bus, eating fast foods, etc.) are at a more general level than those we assume to be governed by a production. Furthermore, these general behaviors are unlikely to occur without awareness. Rather, they are mediated by conscious decisions to engage in the behavior, although individuals may not be aware of all of the reasons for making these decisions.

In the conceptualization we propose, such habitual behaviors are more likely to be mediated by procedures that exist as part of declarative knowledge and become accessible as a result of stimulus cues in the immediate situation with which the concepts composing the procedure are associated. The recurrence of the behaviors simply reflects the fact that features of the situations in which decisions are made are themselves likely to recur. (The discrepancy between individuals' reported intentions and their actual behavior could be attributable to the fact that different subsets of concepts are activated in the situations in which intentions are reported and the situations in which actual behavioral decisions are made.)

Be that as it may, perhaps the most important distinction between habits and productions lies in the fact that habits presumably govern the persistence of behavior over situations of the same type. In contrast, productions play a role in the generalization of behaviors over situations of quite different types.

### 6.3. The “perception–behavior” link.

As we have noted, a production can often be elicited without consciousness of the goals that are attained by applying it. To this extent, the production construct can potentially account for the effects of unconscious goal activation (Chartrand & Bargh, 1996; see also Aarts, Gollwitzer, & Hassin, 2004; Dijksterhuis, 2004). It can also potentially account for many of the phenomena that have been attributed to the existence of a “perception–behavior link” (Dijksterhuis & Bargh, 2001; see also Bargh, 1997; Dijksterhuis et al., 2005). In the aforementioned study by Bargh, Chaiken, et al. (1996) and Bargh, Chen, et al. (1996), for example, exposing participants to concepts associated with the elderly led them to walk more slowly to the elevator upon leaving the experiment. In this study, goal-related situational features (getting to the elevator) may have combined with the primed concepts that were accessible in memory (e.g., “doing things slowly”) to activate a production that spontaneously elicited “slow-walking” behavior without awareness of the conditions that gave rise to it.

The utility of this conceptualization is further evidenced by studies in which African-American faces were primed subliminally, thereby activating a stereotype of African-Americans whose features include both “aggressive” and “unmotivated to perform well in academic achievement situations.” In another experiment by Bargh, Chaiken, et al. (1996) and Bargh, Chen, et al. (1996), priming these faces led European-American participants to display greater irritation upon being asked to repeat a boring experimental task. In a quite different study (Colcombe & Wyer, 2001; see Wyer, 2004), the same priming decreased European-Americans' performance on a test of mathematical ability. Although the same stereotype-based semantic concepts were activated in both cases, different situation-specific productions were activated, depending on the nature of this situation.



## 7. CONCLUDING REMARKS

The effects of past behavior on future behavior and decisions are mediated by its influence on processing at several different stages, ranging from the selective attention to information at the time it is encountered to comprehension, inference, evaluation, and decision making. These effects typically occur in the context of conscious goal-directed processing. However, they can occur without awareness of the factors that give rise to them and without awareness of other goals to which they are relevant.

Our conceptualization assumes that goal-directed behavior is governed by two different cognitive systems. One system governs processes that occur automatically when the conditions that give rise to them are met. The other governs deliberative, goal-directed activities that come into play when individuals consciously decide on a strategy for pursuing the objective at hand. Although our formulation is hardly the first to postulate two different processing systems, it provides a more specific conception of the processes governed by each system and how they interface. The impact of past behavior on both types of processing is mediated in part by semantic concepts and declarative knowledge that have been activated in the course of engaging in this behavior. However, the manner in which these concepts and knowledge come into play in each processing system differs.

The research we reviewed provides support for several implications of our conceptualization. For example, the different effects of (a) the concepts and knowledge that are used as a basis for goal-directed processing and (b) the procedures that operate on this knowledge were demonstrated by Shen and Wyer (2008). Research by Shen, Jiang, et al. (2010) and Shen, Wyer, et al. (2012) confirmed the assumption that the activation of the concept of a goal, either consciously or without awareness, is not necessary for the occurrence of behavior that is directed to the attainment of this goal. Furthermore, the desirability of the goals to which production-elicited behavior is applicable does not influence individuals' likelihood of engaging in this behavior unless these goals are called to their attention.

In addition to specifying the processes that underlie the impact of past behavior on future behavior, our conceptualization permits a wide diversity of phenomena to be integrated. As our review indicates, many phenomena that have been identified in the research conducted within other theoretical rubrics can also be conceptualized within the framework we propose. As we have acknowledged, it is not always clear whether goal-directed behavior is governed by a production and is elicited automatically or whether it is the result of a conscious decision of the sort that is governed by behavioral

mind-sets.<sup>2</sup> Our conceptualization nonetheless calls attention to the desirability of making the distinction in both the areas we have discussed and other areas of social psychological research.

Our formulation does not purport to be a complete theory of goal-directed cognitive activity. Several assumptions remain to be evaluated. For example, the spreading activation metaphor we have used in conceptualizing the factors that influence the activation and retrieval of declarative knowledge is only one of the many possibilities. In refining our conceptualization, other metaphors may ultimately be more fruitful. A version of the “resonance” formulation proposed by Ratcliff (1978; see also Wyer, 2004; Wyer & Radvansky, 1999), which does not require the specification of associative links between specific concepts and schemas, might be particularly useful. The production construct must also be more clearly stated. For example, the factors that influence both the inclusion and the exclusion of activated concepts in a production’s precondition must be specified. Despite these limitations, however, the conceptualization provides a framework for integrating much of the current research on the impact of past behavior on later behavior and serves as a basis for future work in the area.

## ACKNOWLEDGMENTS

This preparation of the chapter and some of the research described therein were supported in part by Grants GRF 453110 and GRF 640011 from the Research Grants Council, Hong Kong.

## REFERENCES

- Aarts, H., Gollwitzer, P. M., & Hassin, R. R. (2004). Goal contagion: Perceiving is for pursuing. *Journal of Personality and Social Psychology, 87*, 2–37.
- Adaval, R. (2001). Sometimes it just feels right: The differential weighting of affect-consistent and affect-inconsistent product information. *Journal of Consumer Research, 7*, 207–245.
- Adaval, R. (2003). How good gets better and bad gets worse: Understanding the impact of affect on evaluations of known brands. *Journal of Consumer Research, 30*, 352–367.
- Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review, 89*, 369–406.
- Anderson, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.
- Anderson, J. R. (1996). ACT: A simple theory of complex cognition. *American Psychologist, 51*, 355–365.

<sup>2</sup> In fact, some of the phenomena we have attributed to the impact of productions (e.g., the role of abstract and relational thinking in comprehension), were conceptualized in an earlier paper in terms of mind-sets (Wyer & Xu, 2010). In retrospect, the impact of productions seems more likely to govern these phenomena. This inconsistency, however, makes salient the need to articulate by empirically and conceptually the different processes that potentially underlie these effects.

- Anderson, J. R., Bothell, D., Lebiere, C., & Matessa, M. (1998). An integrated theory of list memory. *Journal of Memory and Language*, 38, 341–380.
- Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer (Ed.), *Advances in social cognition* (Vol. 10, pp. 1–62). Mahwah, NJ: Erlbaum.
- Bargh, J. A., Chaiken, S., Govender, R., & Pratto, F. (1992). The generality of the automatic attitude activation effect. *Journal of Personality and Social Psychology*, 62, 893–912.
- Bargh, J. A., Chaiken, S., Raymond, P., & Hymes, C. (1996). The automatic evaluation effect: Unconditionally automatic attitude activation in a pronunciation task. *Journal of Experimental Social Psychology*, 32, 104–120.
- Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. *Journal of Personality and Social Psychology*, 43, 437–449.
- Boland, J. E., Chua, H. F., & Nisbett, R. E. (2008). How we see it: Culturally different eye movement patterns over visual scenes. In K. Rayner, D. Shen, X. Bai, & G. Yan (Eds.), *Cognitive and cultural influences on eye movements* (pp. 363–378). Tianjin, China: Tianjin People's Publishing House.
- Briley, D. A., Morris, M., & Simonson, I. (2000). Reasons as carriers of culture: Dynamic versus dispositional models of cultural influence on decision making. *Journal of Consumer Research*, 27, 157–178.
- Briley, D. A., Morris, M., & Simonson, I. (2005). Language triggers cultural frames: In bicultural Hong Kong consumers, English versus Chinese communication evokes divergent cultural patterns of decision making. *Journal of Consumer Psychology*, 27, 157–178.
- Briley, D. A., & Wyer, R. S. (2002). The effect of group membership salience on the avoidance of negative outcomes: Implications for social and consumer decisions. *Journal of Consumer Research*, 29, 400–415.
- Chaiken, S., & Trope, Y. (Eds.), (1999). *Dual-process theories in social psychology*. New York: Guilford.
- Chartrand, T. L., & Bargh, J. A. (1996). Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology*, 71, 464–478.
- Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, 76, 893–910.
- Chartrand, T. L., & Bargh, J. A. (2002). Nonconscious motivations: Their activation, operation and consequences. In A. Tesser & D. Stapel (Eds.), *Self and motivation: Emerging psychological perspectives* (pp. 13–41). Washington, DC: American Psychological Association.
- Childers, T. L., Houston, M. J., & Heckler, S. E. (1985). Measurement of individual differences in visual versus verbal information processing. *Journal of Consumer Research*, 12, 125–134.
- Colcombe, S. J., & Wyer, R. S. (2001). *The effects of image-based priming on lexical access, conceptual activation, and behavior*. Unpublished manuscript, University of Illinois at Urbana-Champaign.
- Collins, A. M., & Loftus, E. F. (1975). A spreading activation theory of semantic processing. *Psychological Review*, 82, 407–428.
- Custers, R., & Aarts, H. (2005). Positive affect as implicit motivator: On the nonconscious operation of behavioral goals. *Journal of Personality and Social Psychology*, 89, 129–142.
- Custers, R., & Aarts, H. (2010). The unconscious will: How the pursuit of goals operates outside of conscious awareness. *Science*, 329, 47–50.
- Dhar, R., Huber, J., & Khan, U. (2007). The shopping momentum effect. *Journal of Marketing Research*, 44, 370–378.
- Dijksterhuis, A. (2004). Think different: The merits of unconscious thought in preference development and decision making. *Journal of Personality and Social Psychology*, 87, 586–598.

- Dijksterhuis, A., & Bargh, J. A. (2001). The perception-behavior expressway: Automatic effects of social perception on social behavior. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 33, pp. 1–40). San Diego: Academic Press.
- Dijksterhuis, A., Smith, P. K., van Baaren, R. B., & Wigboldus, D. H. J. (2005). The unconscious consumer: Effects of environment on consumer behavior. *Journal of Consumer Psychology, 15*, 193–202.
- Dodson, C. S., Johnson, M. K., & Schooler, J. W. (1997). The verbal overshadowing effect: Why descriptions impair face recognition. *Memory and Cognition, 125*, 129–139.
- Duckworth, K. L., Bargh, J. A., Garcia, M., & Chaiken, S. (2002). The automatic evaluation of novel stimuli. *Psychological Science, 13*, 514–520.
- Dunham, Y., & Banaji, M. R. (2010). Platonic blindness and the challenge of understanding content. In B. Mesquita, L. F. Barrett, & E. R. Smith (Eds.), *The mind in context* (pp. 201–213). New York: Guilford.
- Dweck, C. S. (1991). Self-theories and goals: Their role in motivation, personality, and development. In R. Dienstbier (Ed.), *Nebraska symposium on motivation* (Perspectives on motivation (Vol. 38, pp. 199–235). Lincoln: University of Nebraska Press.
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Random House.
- Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry, 6*, 267–285.
- Förster, J. (2011). Local and global cross-modal influences between vision and hearing, tasting, smelling or touching. *Journal of Experimental Psychology: General, 140*, 364–389.
- Förster, J., & Dannenberg, L. (2010). GLOMOsys: A systems account of global versus local processing. *Psychological Inquiry, 21*, 175–197.
- Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. *Journal of Personality and Social Psychology, 87*, 177–189.
- Förster, J., & Liberman, N. (2007). Knowledge activation. In A. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed. pp. 201–231). New York: Guilford.
- Galinsky, A. D., & Moskowitz, G. B. (2000). Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology, 78*, 708–724.
- Goldstone, R. L., & Barsalou, L. W. (1998). Reuniting perception and conception. *Cognition, 65*, 231–262.
- Gollwitzer, P. M., & Bayer, U. (1999). Deliberative versus implemental mindsets in the control of action. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 403–422). New York: Guilford Press.
- Gollwitzer, P. M., Heckhausen, H., & Steller, B. (1990). Deliberative and implemental mind-sets: Cognitive tuning toward congruous thoughts and information. *Journal of Personality and Social Psychology, 59*, 1119–1127.
- Graesser, A. C. (1981). *Prose comprehension beyond the word*. New York: Springer-Verlag.
- Henderson, M. D., de Liver, Y., & Gollwitzer, P. M. (2008). The effects of an implemental mind-set on attitude strength. *Journal of Personality and Social Psychology, 94*, 396–411.
- Higgins, E. T. (1996). Knowledge activation: Accessibility, applicability, and salience. In E. T. Higgins & A. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 133–168). New York: Guilford.
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 55*, 1217–1233.
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 30, pp. 1–46). San Diego, CA: Academic Press.

- Higgins, E. T., Bargh, J. A., & Lombardi, W. (1985). The nature of priming effects on categorization. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *11*, 59–69.
- Higgins, E. T., & Chaires, W. M. (1980). Accessibility of interrelational constructs: Implications for stimulus encoding and creativity. *Journal of Experimental Social Psychology*, *64*, 348–361.
- Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology*, *13*, 141–154.
- Hirt, E. R., Kardes, F. R., & Markman, K. D. (2004). Activating a mental simulation mindset through generation of alternatives; Implications for debiasing in related and unrelated domains. *Journal of Experimental Social Psychology*, *40*, 374–383.
- Huang, J. Y., & Bargh, J. A. (2008). Peak of desire: Activating the mating goal changes life-stage preferences across living kinds. *Psychological Science*, *19*, 573–578.
- Janiszewski, C., & van Osselaer, S. M. J. (2005). Behavior activation is not enough. *Journal of Consumer Psychology*, *15*, 218–224.
- Ji, M. F., & Wood, W. (2007). Purchase and consumption habits: Not necessarily what you intend. *Journal of Consumer Psychology*, *17*, 261–276.
- Jiang, Y., Steinhart, Y., & Wyer, R. S. (2010). *The role of visual and semantic processing strategies in consumer information processing*. Unpublished manuscript, Hong Kong University of Science and Technology.
- Jiang, Y., & Wyer, R. S. (2009). The role of visual perspective in information processing. *Journal of Experimental Psychology*, *45*, 486–495.
- Kosslyn, S. M. (1976). Can imagery be distinguished from other forms of internal representation? Evidence from studies of information retrieval time. *Memory and Cognition*, *4*, 291–297.
- Kray, L. J., & Galinsky, A. D. (2003). The debiasing effect of counterfactual mind-sets: Increasing the search for disconfirmatory information in group decisions. *Organizational Behavior and Human Decision Processes*, *91*, 69–81.
- Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A theory of goal systems. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 34, pp. 331–378). San Diego, CA: Academic Press.
- Kühnen, U., & Oyserman, D. (2002). Thinking about the self influences thinking in general: Cognitive consequences of salient self-concept. *Journal of Experimental Social Psychology*, *38*, 492–499.
- Liberman, N., Trope, Y., & Stephan, E. (2007). Psychological distance. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed. pp. 353–383). New York: Guilford Press.
- Logan, G. D. (1988). Toward an instance theory of automatization. *Psychological Review*, *95*, 492–527.
- Macrae, C. N., & Lewis, H. L. (2002). Do I know you? Processing orientation and face recognition. *Psychological Science*, *13*, 194–196.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion and motivation. *Psychological Review*, *98*, 224–253.
- Masuda, T., & Nisbett, R. E. (2001). Attending holistically versus analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology*, *81*, 922–934.
- Miller, P. J., Fung, H., & Mintz, J. (1996). Self-construction through narrative practices: A Chinese and American comparison of early socialization. *Ethos*, *24*, 237–280.
- Miller, P. J., Wiley, A. R., Fung, H., & Liang, C. H. (1997). Personal storytelling as a medium of socialization in Chinese and American families. *Child Development*, *68*, 557–568.

- Muthukrishnan, A. V., Wathieu, L., & Xu, A. J. (2009). *Ambiguity aversion and preference for established brands*. Unpublished manuscript, Hong Kong University of Science and Technology.
- Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology*, *9*, 353–383.
- Nisbett, R. E. (2003). *The geography of thought: How Asians and westerners think differently*. New York: Free Press.
- Norenzayan, A., Choi, I., & Peng, K. (2007). Perception and cognition. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology* (pp. 569–594). New York: Guilford Press.
- Novemsky, N., Dhar, R., Schwarz, N., & Simonson, I. (2007). Preference fluency in choice. *Journal of Marketing Research*, *44*, 347–356.
- Oyserman, D., Sorensen, N., Reber, R., & Chen, S. X. (2009). Connecting and separating mind-sets: Culture as situated cognition. *Journal of Personality and Social Psychology*, *97*, 217–235.
- Park, D. C., Nisbett, R. E., & Hedden, T. (1999). Culture, cognition, and aging. *Journal of Gerontology*, *54B*, 75–84.
- Ratcliff, R. (1978). A theory of memory retrieval. *Psychological Review*, *85*, 59–108.
- Rosch, E., Mervis, C. B., Gray, W., Johnson, D., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology*, *8*, 382–439.
- Ross, M. (1989). Relation of implicit theories to the construction of personal histories. *Psychological Review*, *96*, 341–357.
- Rumelhart, D. E. (1984). Schemata and the cognitive system. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (Vol. 1, pp. 161–188). Hillsdale, NJ: Erlbaum.
- Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals and understanding*. Hillsdale, NJ: Erlbaum.
- Schank, R. C., & Abelson, R. P. (1995). Knowledge and memory: The real story. In R. S. Wyer (Ed.), *Advances in social cognition: Knowledge and memory: The real story* (Vol. 8, pp. 1–85). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Schneider, W., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: I. Detection, search, and attention. *Psychological Review*, *84*, 1–66.
- Schooler, J. W., & Engstler-Schooler, T. Y. (1990). Verbal overshadowing of visual memories: Some things are better left unsaid. *Cognitive Psychology*, *22*, 36–71.
- Schwarz, N. (1998). Accessible content and accessibility experiences: The interplay of declarative and experiential information in judgment. *Personality and Social Psychology Review*, *2*, 87–99.
- Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology*, *14*, 332–348.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*, 513–523.
- Schwarz, N., & Wyer, R. S. (1985). Effects of rank ordering stimuli on magnitude ratings of these and other stimuli. *Journal of Experimental Social Psychology*, *21*, 30–46.
- Shafir, E. (1993). Choosing vs. rejecting: Why some options are both better and worse than others. *Memory and Cognition*, *21*, 546–556.
- Shen, H., Jiang, J., & Adaval, R. (2010). Contrast and assimilation effects of processing fluency. *Journal of Consumer Research*, *36*, 876–889.
- Shen, H., & Wyer, R. S. (2008). Procedural priming and consumer judgments: Effects on the impact of positively and negatively valenced information. *Journal of Consumer Research*, *34*, 727–737.
- Shen, H., & Wyer, R. S. (2010). Cognitive and motivational influences of past behavior on variety seeking. *Journal of Consumer Psychology*, *20*, 33–42.

- Shen, H., Wyer, R. S., & Cai, F. (2012). The generalization of deliberative and automatic behavior: The role of procedural knowledge and affective reactions. *Journal of Experimental Social Psychology*. doi:10.1016/j.jesp.2012.02.005.
- Smith, E. R. (1984). Model of social inference processes. *Psychological Review*, *91*, 392–413.
- Smith, E. R. (1990). Content and process specificity in the effects of prior experiences. In T. K. Srull & R. S. Wyer (Eds.), *Advances in social cognition* (Vol. 3, pp. 1–59). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Smith, E. R. (1994). Procedural knowledge and processing strategies in social cognition. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., Vol. 1, pp. 101–151). Hillsdale, NJ: Erlbaum.
- Srull, T. K., & Wyer, R. S. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology*, *37*, 1660–1672.
- Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review*, *8*, 220–247.
- Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review*, *96*, 506–520.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*, 403–421.
- Trope, Y., Liberman, N., & Wakslak, C. (2007). Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior. *Journal of Consumer Psychology*, *17*(2), 83–95.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*, 1124–1130.
- Verplanken, B. (2006). Beyond frequency: Habit as mental construct. *British Journal of Social Psychology*, *45*, 639–656.
- Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology*, *81*, 989–1000.
- Winkielman, P., Schwarz, N., Fazendeiro, T. A., & Reber, R. (2003). The hedonic marking of processing fluency: Implications for evaluative judgment. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 189–217). Mahwah, NJ: Erlbaum.
- Wood, W., & Neal, D. T. (2007). A new look at habits and the habit-goal interface. *Psychological Review*, *114*, 843–863.
- Wyer, R. S. (1969). Effects of general response style on own attitude and the interpretation of attitude-relevant messages. *The British Journal of Social and Clinical Psychology*, *8*, 104–115.
- Wyer, R. S. (2004). *Social comprehension and judgment: The role of situation models, narratives, and implicit theories*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wyer, R. S. (2007). Principles of mental representation. In A. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed. pp. 231–285). New York: Guilford.
- Wyer, R. S. (2008). The role of knowledge accessibility in cognition and behavior: Implications for consumer information processing. In C. Haugtvedt, P. Herr, & F. Kardes (Eds.), *Handbook of consumer psychology* (pp. 31–76). Mahwah, NJ: Erlbaum.
- Wyer, R. S., Adaval, R., & Colcombe, S. J. (2002). Narrative-based representations of social knowledge: Their construction and use in comprehension, memory and judgment. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 34, pp. 133–197). San Diego: Academic Press.
- Wyer, R. S., Budesheim, T. L., Shavitt, S., Riggle, E. J., Melton, J., & Kuklinski, J. H. (1991). Image, issues and ideology: The processing of information about political candidates. *Journal of Personality and Social Psychology*, *61*, 533–545.

- Wyer, R. S., & Carlston, D. E. (1979). *Social cognition, inference and attribution*. Hillsdale, NJ: Erlbaum.
- Wyer, R. S., & Hartwick, J. (1980). The role of information retrieval and conditional inference processes in belief formation and change. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 13, pp. 241–284). New York: Academic Press.
- Wyer, R., & Hartwick, J. (1984). The recall and use of belief statements as bases for judgments: Some determinants and implications. *Journal of Experimental Social Psychology*, 20, 65–85.
- Wyer, R. S., Hung, I. W., & Jiang, Y. (2008). Visual and verbal processing strategies in comprehension and judgment. *Journal of Consumer Psychology*, 18, 244–257.
- Wyer, R. S., & Radvansky, G. A. (1999). The comprehension and validation of social information. *Psychological Review*, 106, 89–118.
- Wyer, R. S., & Srull, T. K. (1989). *Memory and cognition in its social context*. Hillsdale, NJ: Erlbaum.
- Wyer, R. S., & Xu, A. J. (2010). The role of behavioral mindsets in goal-directed activity: Conceptual underpinnings and empirical evidence. *Journal of Consumer Psychology*, 20, 107–125.
- Xu, A. J. (2010). *The influence of past behavior on future behavior: A mind-set perspective*. Unpublished Ph.D. dissertation, University of Illinois at Urbana-Champaign.
- Xu, A. J., & Wyer, R. S. (2007). The effect of mindsets on consumer decision strategies. *Journal of Consumer Research*, 34, 556–566.
- Xu, A. J., & Wyer, R. S. (2008). The comparative mindset: From animal comparisons to increased purchase intentions. *Psychological Science*, 19, 859–864.
- Xu, A. J., & Wyer, R. S. (2012). The role of bolstering and counterarguing mindsets in persuasion. *Journal of Consumer Research*, 38, 920–932.
- Zhang, M., & Wang, J. (2009). Psychological distance asymmetry: The spatial dimension vs. other dimensions. *Journal of Consumer Psychology*, 19, 497–507.