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Attitudes and Attitude Change

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attitude measurement, embodied cognition, explicit attitude, implicit attitude, meta-cognition, persuasion

Abstract

Attitudes and attitude change remain core topics of contemporary social psychology. This selective review emphasizes work published from 2005 to 2009. It addresses constructionist and stable-entity conceptualizations of attitude, the distinction between implicit and explicit measures of attitude, and implications of the foregoing for attitude change. Associative and propositional processes in attitude change are considered at a general level and in relation to evaluative conditioning. The role of bodily states and physical perceptions in attitude change is reviewed. This is followed by an integrative perspective on processing models of persuasion and the consideration of meta-cognitions in persuasion. Finally, effects of attitudes on information processing, social memory, and behavior are highlighted. Core themes cutting across the areas reviewed are attempts at integrative theorizing bringing together formerly disparate phenomena and viewpoints.

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INTRODUCTION

Attitudes are a core concept of long-standing (Allport 1935) and continued importance to (social) psychology. Recent years have seen an explosion of literature on automatic, implicit aspects of attitudinal processing (a literature search on the Social Sciences Citation Index with Boolean operators "[implicit OR automatic] AND [evaluati* OR attitud*]" from 2005 to February 2010 yielded 1,771 references). This work has informed and invigorated debates about the best conceptualization of attitudes (e.g., Fabrigar et al. 2005) as well as integrative theorizing about the links between attitude structure and processes of attitude change (see Gawronski & Bodenhausen 2006). Moreover, basic research along these lines in social psychology has inspired and influenced applied research, for example in consumer psychology (e.g., Gibson 2008) and in personnel psychology (e.g., Johnson et al. 2010).

Attitudes: evaluations of an object of thought

Attitude change: change in the evaluation of an object of thought

Implicit attitudes: attitudes measured by implicit procedures, e.g., the implicit association test

MODE: motivation and opportunity as determinants model

MCM: meta-cognitive model

In this review, we focus on literature that was published between 2005 and 2009. We thus build on and update a previous review in this series by Crano & Prislin (2006), who covered the period up to 2004. Key themes of our review are the dynamic relationship between attitude representation and change, reflecting the recent efforts of attitude researchers to integrate the growing field of implicit attitudes with the more traditional study of persuasion. We also discuss new research on the effects of attitudes on information processing and behavior. In doing so, our aim is to delineate broad themes of this current phase of attitude research by highlighting key debates and studies rather than to provide complete coverage of the field.

THE ATTITUDE CONCEPT

Discussing the conceptualization of attitudes, we first outline key problems of definition, then turn to the measurement of attitudes, and finally point out some implications of these conceptual issues for the study of attitude change.

What is an Attitude?

An attitude is an evaluation of an object of thought. Attitude objects comprise anything a person may hold in mind, ranging from the mundane to the abstract, including things, people, groups, and ideas. Most researchers agree on these core definitions, but more elaborate models of the attitude concept vary considerably. The definitions that researchers provided in a special issue of *Social Cognition* (2007, Vol. 25[5]), called "What's an Attitude?", differ in the extent to which they adopt the view that attitudes are stable entities stored in memory versus temporary judgments constructed on the spot from the information at hand (Gawronski 2007) (see **Figure 1**).

Some models clearly endorse either a stable-entity or a constructionist view, whereas others take a more intermediate position. On the stable-entity side of the continuum we see the MODE (motivation and opportunity as determinants) model (Fazio 2007) and the meta-cognitive model (MCM, Petty et al.

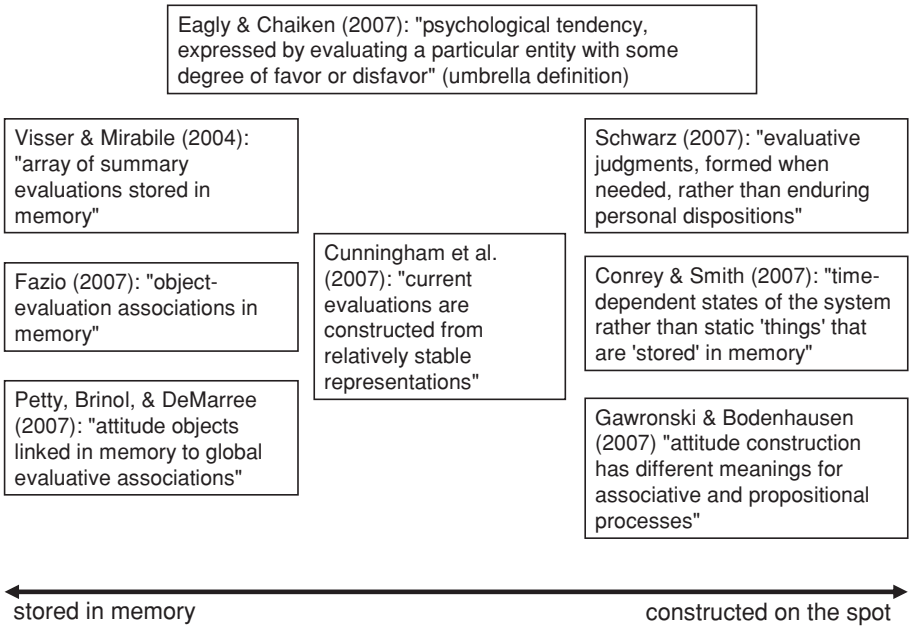

Figure 1

Attitude definitions, ordered according to their conceptualization of attitudes as stable entities (*left*) versus temporary constructions (*right*).

2007), which both treat attitudes as long-term memory structures. In the MODE model, the representation of an object is linked to a global evaluation; encountering the object will thus bring to mind the global evaluation by means of an associative link. The MCM makes similar structural assumptions but includes the possibility that an object is linked to more than one summary evaluation with varying associative strength. At the constructionist side of the continuum we find the model proposed by Schwarz (2007), who sees attitudes not as enduring personal dispositions (p. 639) but rather as evaluative judgments that are constructed in the situation based on currently accessible information. Importantly, the pieces of information being used in the construction process may include stored evaluations, but these are not accorded any special theoretical status compared to other accessible content. Similarly, in their associative-propositional evaluation (APE) model, Gawronski & Bodenhausen (2007) view attitudes as constructed in the situation; they also emphasize two types of input process, as we discuss further below. Also adopting a radical construction view, Conrey & Smith (2007) emphasize that attitudes are "time–dependent states of the system" rather than "static 'things' that are 'stored' in memory" (p. 718). More intermediate positions are taken by Eagly & Chaiken (2007), who present an "umbrella definition" that encompasses the key features of tendency, entity (or attitude object), and evaluation (p. 582), and by Cunningham et al. (2007), whose iterative reprocessing model represents a combined view in that "current evaluations are constructed from relatively stable attitude representations" (p. 736).

Considering the empirical evidence of context-sensitivity versus stability of attitudes, each view has its strengths and limitations. Whereas abundant evidence for the context-sensitivity of evaluative judgments supports a constructionist view, there is also evidence for high stability of many attitudes even in the face of changing situations (see Schwarz 2007). Such cross-situational stability appears

APE: associative-propositional evaluation model

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Explicit attitude: attitude measured by self-report instruments, e.g., questionnaires

straightforward if one assumes that attitudes are stored in long-term memory, ready to be accessed and used when needed, as in a "mental file-drawer" (see Bohner et al. 2008b, Smith & Conrey 2007). However, stability is also within the explanatory range of radical construction models (e.g., Conrey & Smith 2007). Research has shown that judgments are rendered chronically more accessible after having been constructed many times in similar situations with the same result (Higgins 1996). Even if the situational input varies slightly, the resulting overall evaluation may remain the same as long as the valence of the input does not change, again producing stability over time (Schwarz & Bohner 2001). Conversely, the file-drawer perspective may explain context effects on attitudes in various ways (see Castelli & Tomelleri 2008, Tormala & Petty 2007, Visser & Mirabile 2004). In this view, one moderator of attitude stability is the concept of attitude strength (Petty & Krosnick 1995). Attitude strength can be defined as "the extent to which attitudes manifest the qualities of durability and impactfulness" (Krosnick & Petty 1995, p. 2; for a recent review, see Bassili 2008). The assumption is that strong attitudes are more stable across situations and over time and, hence, can consistently be recalled from memory, whereas weak attitudes are less accessible and thus more susceptible to context influences. It should be noted, however, that chronic accessibility of the information used to construct an attitude may yield the same stability in attitude judgments as may chronic accessibility of the attitude itself.

Another way of conceptualizing context effects within a file-drawer perspective is by assuming that memory representations of an object may contain two or more summary evaluations, each of which may be further associated with a validity tag that represents its conscious endorsement. For example, a formerly heavy smoker may have acquired a strong association between the representation of the act of smoking and a positive evaluation; then, on the basis of health information, this person may have formed a new, negative evaluation of smoking, which becomes tagged as valid, whereas the old evaluation persists in memory but becomes tagged as invalid. Such assumptions allow for ambivalent attitudes, where both positive and negative evaluations are linked to the same object, and for fluctuations in judgment, if the relative accessibility of these evaluations and of their associated validity tags varies with the situation (Petty et al. 2007).

On the one hand, we see a constructionist view of attitudes as both powerful in its explanatory range and, at the same time, highly parsimonious (Schwarz 2007). On the other hand, theories inspired by the file-drawer view, such as the MCM (Petty et al. 2007), although less parsimonious in their assumptions, have generated new hypotheses and stimulated research, as we discuss below. For future research it may be useful to combine the strengths of the two approaches and to take into account both stable and situationally variable aspects of attitudes.

Measuring Attitudes

To measure attitudes, researchers have long been using self-report scales, which directly ask a respondent to evaluate an attitude object by checking a numeric response on single or multiple items (see Himmelfarb 1993). Until recently, such explicit attitude scales were by far the most popular measures used (see Greenwald & Banaji 1995). The rationale behind self-report scales of attitude is that people are both willing and able to accurately report their attitudes; however, these conditions are not always met, as attitudes may not be open to introspective access or people may try to hide their attitudes in order to present themselves positively (see Krosnick et al. 2005, Schwarz 2008). To overcome these problems, a variety of implicit attitude measures has been introduced over the past two decades (see Fazio & Olson 2003). The two main purposes of these measures are to minimize motivated response biases—continuing a long tradition of nonreactive measurement (Webb et al. 1981)—and to investigate aspects of attitudes that are not open to introspection. This new class of response-time-based paradigms has

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produced a large body of research and shed new light on the conceptual richness of attitudes. Most popular among these paradigms are the implicit association test (IAT, Greenwald et al. 1998; for reviews, see Greenwald et al. 2009, Nosek et al. 2007) and the evaluative priming task (for reviews, see De Houwer et al. 2009, Klauer & Musch 2003). Their underlying assumption is that evaluative associations in a perceiver's mind should produce different levels of interference or facilitation in responses to evaluative stimuli and to categorical stimuli that represent an attitude object. Accordingly, differences in response times are used to infer implicit attitudes.

In an IAT, participants repeatedly press left- or right-hand keys to sort stimuli (e.g., first names and adjectives) into dichotomous target categories (e.g., male-female) and evaluative categories (e.g., positive-negative). Importantly, in a first critical block, combinations of targets and evaluations share a single response key (e.g., left key = "female or positive"; right key = "male or negative"), and in a subsequent critical block, the target assignment is reversed (e.g., left key = "male or positive"; right key = "female or negative"). The response time difference between the two critical blocks is used as an indicator of automatic evaluation, that is, a person who responds faster to the first block in this example would display a more positive implicit attitude toward women than men (for a discussion of scoring algorithms, see Greenwald et al. 2003).

In the evaluative priming task, participants press keys to evaluate target stimuli (e.g., adjectives), which are preceded by primes—sometimes masked—that represent attitude objects (e.g., pictures of old versus young people). If the evaluations of the prime and the target match, response times are reduced; if prime and target evaluations mismatch, response times are prolonged. The difference in response times between matching and nonmatching trials thus indicates a difference in automatic evaluation of the primed attitude object. For example, a person who responds faster to trials with old faces and positive adjectives or young faces and negative adjectives than to trials with the reverse combinations would display an implicit preference for old faces (see De Houwer et al. 2009, especially pp. 358–362).

IAT: implicit association test

Other paradigms for implicit attitude measurement were developed more recently, including single-concept variants of the IAT (for discussion, see Siebler et al. 2010), the recoding-free IAT (Rothermund et al. 2009), and the affective misattribution paradigm (Payne et al. 2005). An exhaustive review of this thread of research is beyond the scope of this article (for recent reviews, see De Houwer et al. 2009, Petty et al. 2009, Wittenbrink & Schwarz 2007). We focus here on the influence of this methodological development on the conceptualization of attitudes and on theorizing about attitude change.

The process assumptions underlying response-time-based paradigms remain contentious (Fiedler et al. 2006, Gawronski 2007, Klauer 2010, Sherman 2006, Wentura & Rothermund 2007). Although some researchers have viewed implicit measures as a "bona fide pipeline" to the "true" attitude, free from social desirability effects (Fazio et al. 1995), others have pointed out that these measures assess new aspects of attitudes that could not be studied by using self-report measures (Greenwald & Banaji 1995). Both views are relevant to the debate between stable-entity and constructionist conceptions: If attitudes are stored evaluations, then the aim of measurement should be to assess these stable evaluations precisely and properly. If attitudes are temporary constructions, any new aspect bearing on the construction process that can be measured will help to predict the evaluative outcome.

Recently, researchers have started to integrate evidence from implicit attitude measurement into theories of what attitudes are and how attitudes change (see Gawronski 2007). The MCM (Petty 2006, Petty et al. 2007) assumes that implicit measures tap predominantly into automatic associations, whereas explicit measures reveal those attitudes that the individual considers to be valid, as represented in validity tags that are stored in memory along with

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the attitude object and its evaluations (but see Gawronski & Bodenhausen 2006, who conceptualize the truth value of association to be processed on-line). However, other researchers have pointed out that there is no process-pure measurement paradigm and hence no one-to-one correspondence between the type of measure and the type of representation or process being assessed (Conrey et al. 2005, Sherman 2006; see also Klauer 2010).

To explain why correlations between implicit and explicit attitude measures widely vary across studies (Hofmann et al. 2005b, Rydell et al. 2007), researchers have emphasized the role of elaboration. The more the participants elaborated their self-report answers, the less these answers corresponded to implicit measures (Fazio & Olson 2003, Wilson et al. 2000). With their APE model, Gawronski & Bodenhausen (2006, 2007) presented an integration of findings regarding different patterns of implicit and explicit attitude change, as we review in more detail below.

Implications for Attitude Change

The previous sections show that conceptualizations of attitude differ in the extent to which they describe attitudes as being constructed on-line or stored in memory. Also, attitudes can be measured by using explicit self-report instruments or implicit response-time-based measures. These differences in attitude conceptualization and measurement bear on the theoretical understanding of attitude change.

From a constructionist perspective, attitude change results from a different set of information being activated and considered at the time an attitude judgment is made; from a file-drawer perspective, attitude change reflects a change in the underlying memory representation of the attitude in question. A challenge to the constructionist account thus lies in explaining why attitude change sometimes leads to a relatively permanent new attitude whose report does not vary much across situations. From this perspective, stability is expected either if the context of the attitude judgment remains stable, thus rendering the same information temporarily accessible across situations, or if the judgment is solely based on chronically accessible information that comes to mind in all situations (Schwarz 2007, Schwarz & Bohner 2001). Conversely, a challenge to the file-drawer account lies in explaining why attitude change sometimes leads to a new attitude that is unstable and seems to vary with the context. One recently proposed solution is that after a new attitude has been formed and stored, for example by a successful persuasion attempt, the old attitude may remain stored in memory but be tagged as invalid. Situational malleability would thus result from differential accessibility of the old and new attitude representations and their respective (in-)validity tags (Petty 2006, Petty et al. 2006).

Studies of attitude change that have used both explicit and implicit measures produced mixed results (see Gawronski & Bodenhausen 2006, Hofmann et al. 2005b). Some studies demonstrated parallel change on both measures, whereas others showed implicit but not explicit attitude change, or vice versa. This reflects on the questions of which processes underlie changes on implicit and explicit attitude measures and of whether they are the same or different. In the next section, we discuss how different conceptualizations of attitude and different types of attitude measure bear on our current understanding of attitude change.

ATTITUDE CHANGE

In this section, we first consider a potential distinction between attitude formation and attitude change. Then we discuss conceptual similarities and differences between implicit and explicit attitude change. In further subsections, we address new research on the role of bodily states in attitude change and on persuasion, respectively.

Attitude Formation and Attitude Change

We have seen that attitudes may be defined along a continuum, ranging from purely

memory-based summary evaluations that are easily retrieved to evaluative judgments that are constructed from currently accessible information. From a strictly constructionist perspective, all attitude change must be conceptualized as differences between repeated instances of attitude formation, whereas a strictly memory-based model would have to posit that old attitudes are taken out of their mental file-drawers and replaced by new ones. Integrating these views, we assume that attitude change involves both the retrieval of stored evaluations and the consideration of new evaluative information to varying extents. Therefore, it may not be useful to distinguish between attitude formation and attitude change; instead, we speak of attitude change whenever people process information with the result of forming an evaluation of an object of thought (cf. Crano & Prislin 2006, Walther & Langer 2008).

Within a memory-based conceptualization, an interesting possibility is that old attitudes remain stored in memory as new attitudes are formed, leading to dual (or multiple) attitude representations for the same object. For example, Wilson et al. (2000) proposed that two attitude systems exist that allow people to hold implicit and explicit evaluations of opposite valence toward a given object. Context-dependent variations in evaluative judgments may then depend on which of the stored evaluations is more accessible in a given situation and on the individual's motivation and ability to reflect on his or her attitude.

PAST: "past attitudes are still there" model

A more general model of multiple attitudes is Petty and colleagues' MCM (Petty 2006), which was introduced in relation to attitude change processes as the "past attitudes are still there" (PAST) model (Petty et al. 2006). According to the model, old attitudes that the individual does not consider as valid or appropriate any more are "tagged" in memory as false. **Figure 2** illustrates this state of affairs for the example of an individual who initially held a positive evaluation of the concept of smoking (top panel, before attitude change). After processing a persuasive communication about the health hazards of smoking, this person may form a negative attitude (bottom panel, after attitude change); the former positive attitude, however, will remain stored and be tagged as invalid (see Petty et al. 2006). Thus, according to the PAST model, attitude change would be characterized as attitude formation plus tagging stored attitudes as valid or invalid. Importantly, the PAST model predicts that attitude

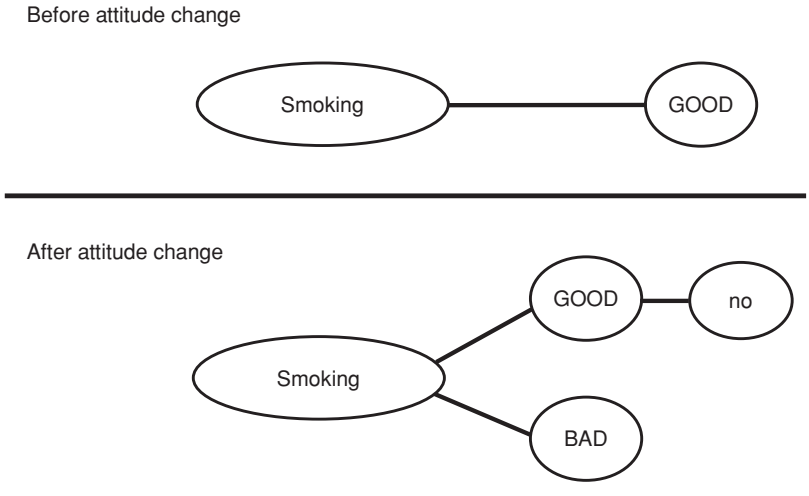

Figure 2

Attitude change according to the "past attitudes are still there" (PAST) model (adapted from Petty et al. 2006).

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ELM: elaboration likelihood model

change may cause people to experience "implicit ambivalence," i.e., a state of uncertainty at an unconscious level. In line with this prediction, people who had changed their explicit attitude showed higher ambivalence on an IAT measure compared to people who had held the same explicit attitude to begin with (Petty et al. 2006, study 2). It should be noted, however, that ambivalent attitudes may result not only from a new attitude being superimposed on an old attitude of opposite valence. Another possibility is that people have contrasting evaluations of two subsets within the same domain, leading to ambivalence about the overall domain (e.g., Cuddy et al. 2008).

Does Implicit Attitude Change Function Like Explicit Attitude Change?

Recently, Petty & Briñol (2010) have attempted to integrate empirical evidence from implicit measures of attitude into the elaboration likelihood model (ELM) of attitude change (Petty & Cacioppo 1986). Their integration represents a macroperspective on attitude change, and the distinction between implicit and explicit attitude change is not its main focus. Instead, differences between implicit and explicit attitude measures are explained as being due to these measures' differential susceptibility to motivated response biases. According to the ELM, attitude-relevant information can be processed at high or low levels of effort, with higher effort leading to a longer-lasting change in explicit measures of attitudes. The same may be true for implicit measures of attitude: In an experiment by Briñol and colleagues (2009, experiment 1, pp. 293–295), IAT scores indicated less implicit prejudice toward black professors after students had carefully processed strong (but not weak) arguments concerning the merits of a policy to integrate black professors into their university. Because this effect depended on argument quality and processing effort, it suggests a modification of implicit evaluations through deliberative thinking. Thus, implicit measures can be influenced by the amount of thinking just like explicit self-report measures (for a review of related evidence, see Petty & Briñol 2010). Overall, the ELM provides a good basis for organizing findings with implicit and explicit measures into a general empirical framework. However, it does not offer a theoretical explanation for why changes in implicit and explicit measures are often dissociated. This may be because both implicit and explicit measures are affected by more than one underlying process of attitude change. Theories that deal with this issue are addressed next.

Associative and propositional processing in evaluations. A more fine-grained approach that can account for a complex interplay of implicit and explicit attitude change is the APE model (Gawronski & Bodenhausen 2006). It assumes that attitudes can be rooted in two types of mental processes: associative evaluation and propositional reasoning. Associative evaluations are seen as the basis of implicit attitudes. They are activated automatically on encountering a relevant stimulus. Depending on the context, different associative patterns and thus different automatic evaluations may be activated. This draws on connectionist theory (Conrey & Smith 2007, Monroe & Read 2008, Smith 1996), whose concept of pattern activation is compatible with the idea of attitudes as temporary constructions (also see Bohner et al. 2008b). Importantly, associative evaluations are independent of truth values. An implicit measure like the IAT may thus, for example, indicate that a person shows a negative evaluation of immigrants, although the person may consciously regard such an evaluation as inappropriate or false. Changes on implicit measures are assumed to be due to changes in the activating stimulus set or changes in the representing associative structure.

Propositional reasoning forms the basis of explicit attitudes. Such evaluations are based on syllogistic inferences about propositional information that is relevant for a judgment. Importantly, following Strack & Deutsch (2004), these inferences are carried out in a reflective system that uses inputs from an associative store

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and transforms them into propositions (for example, a positive associative reaction to pizza may be transformed into the proposition "I like pizza"). The resulting propositions are checked for validity via syllogistic reasoning that assigns truth values to them. A proposition is perceived as valid if it is consistent with other propositions that are seen as relevant to the judgment at hand.

The transformation of associative evaluations into propositions that may or may not be consciously endorsed explains how a change of implicit attitudes may contribute to a change in explicit attitudes. The opposite direction of influence, however, from propositions to associative reactions, is also possible. Gawronski & Bodenhausen (2006) assume that "merely entertaining a particular proposition increases the momentary activation level of corresponding associations in memory" (p. 694). In this way, the mere knowledge of a cultural stereotype may contribute to automatic negative evaluations of minority groups, even if the stereotype is not endorsed (Devine 1989). Members of derogated minority groups may even come to show automatic negative reactions toward their own group in comparison to the majority group (e.g., Haye et al. 2010, Siebler et al. 2010).

The crucial point for the current discussion is that a change of implicit attitudes may result in an indirect change of explicit attitudes, and vice versa. As the truth values assigned to evaluative propositions may or may not correspond to the evaluative implications of mere associations, this can result in different degrees of covariation between implicit and explicit measures of attitude. Gawronski & Bodenhausen (2006) describe eight cases in which associative evaluation and propositional reasoning may independently or jointly produce effects on implicit and explicit measures of attitude. We discuss here two exemplary cases involving indirect influences: (*a*) an indirect influence of informational input on propositional reasoning that is mediated by a direct influence on associative reasoning (see **Figure 3**, paths a and a′), and (*b*) an indirect influence of informational input on associative reasoning that is mediated by a direct influence on propositional reasoning (see **Figure 3**, paths b and b′).

Recent work on the mere exposure effect may illustrate the first case (the a-a′ path in **Figure 3**). Subliminal repeated exposure to stimuli from a given category may affect associative evaluations outside of conscious awareness; this, in turn, may provide the basis for deliberate

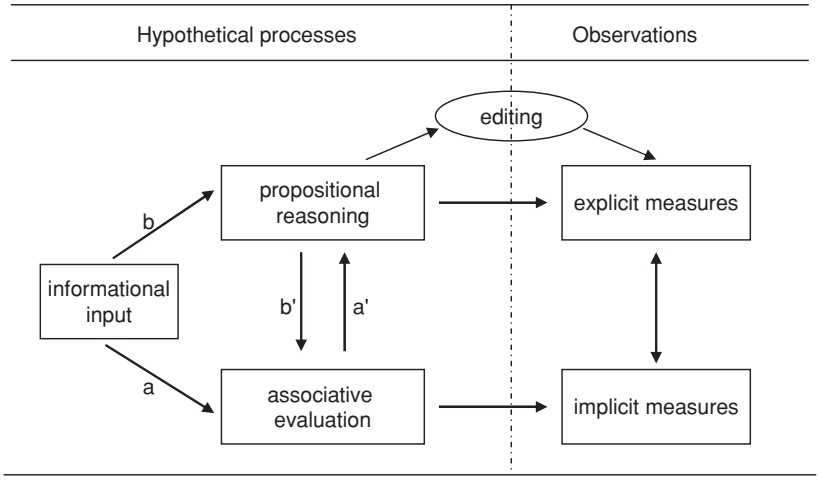

Figure 3

Direct and indirect effects of informational input on explicit and implicit measures of attitude via propositional reasoning and associative evaluation.

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EC: evaluative conditioning

evaluative judgments. For example, Zebrowitz et al. (2008) found that white students who had been subliminally exposed to black faces later rated other black faces as more likable than did students not exposed to faces or exposed to white faces (experiment 2). Conversely, the persuasion study on attitudes toward black professors we discussed above (Briñol et al. 2009) may serve as an example for the second case (the b–b′ path in **Figure 3**). In that study, the persuasive message about the program to integrate black professors affected propositional reasoning about this target group, which in turn influenced evaluative associations to yield a change in IAT scores. More examples for indirect effects of both kinds are reported by Gawronski & Bodenhausen (2006).

It should be noted, however, that a change in propositional reasoning may not necessarily produce a direct effect on explicit measures but may nonetheless cause an indirect effect on an implicit measure. This may happen because people often edit their self-reports because of self-presentation motives or normative influences (see the "editing" oval in **Figure 3**). In a study by Bohner and colleagues (2008c), participants with a dual, Turkish-German, national identity were asked to list what they thought was positive either about being Turkish or about being German. Later, their attitudes toward Germans and Turks were assessed using single-category implicit association tests (SC-IATs) and self-report scales. Results showed that the experimental task affected SC-IAT scores, whereas explicit attitude measures remained unaffected. Thus, the thought listing about positive aspects of a given identity—which can be conceived as a propositional reasoning task—seemed to affect only implicit, not explicit, attitudes. Bohner and colleagues explained this asymmetry with the operation of an impression motive. Most participants' Turkish identity clearly predominated over their German identity, as was evident on both implicit and explicit indicators. Being aware of this relative preference for their Turkish identity, participants may have been reluctant to change their responses to the self-report measures in line with the content of the thought listing. Nonetheless, the task may have changed evaluative associations that were reflected in the SC-IATs.

This last study illustrates that the result pattern on implicit versus explicit measures alone does not provide an unambiguous clue to the processes that may have mediated attitude change and to their interplay (see also Conrey et al. 2005, Hofmann et al. 2005a). At a more general level, the APE model has been criticized by advocates of single-process models (Albarracín et al. 2006, Kruglanski & Dechesne 2006), who proposed that the assumption of qualitatively distinct processes was not necessary—instead, differences in implicit and explicit attitude change could also be explained as being based on a single process: Albarracín et al. (2006) frame effects on implicit as well as on explicit measures as caused by a single associative process that may vary in complexity, whereby more complex associations include the order of associated objects. Conversely, Kruglanski & Dechesne (2006) see evidence for a pervasive principle of syllogistic reasoning in all attitude change phenomena. In their perspective, associative processing, like any other evaluative process, may be conceptualized as a person's following "if . . . then" rules, which may happen at a conscious or unconscious level. In the next section we further illustrate the debate on whether associative and propositional processes are qualitatively distinct and empirically separable, using evaluative conditioning as a paradigmatic case.

Evaluative Conditioning. Evaluative conditioning (EC) can be described as "an observed change in the liking of a stimulus that results from pairing this stimulus with another, liked or disliked stimulus" (De Houwer et al. 2005, p. 162). Numerous studies on EC have shown that the repeated pairing of a positive or negative unconditioned stimulus (US) with a neutral conditioned stimulus (CS) results in more positive evaluations of the CS. According to Gawronski & Bodenhausen (2006), EC may be seen as a "prototypical case" of a pure

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associative change process (p. 697). By contrast, Kruglanski & Dechesne (2006) argued that EC may be understood in terms of a syllogistic reasoning process that could be described as following the rule: "If pleasant stimulus A appears on the screen, then stimulus B appears, too. The pleasant feeling emerges, thus, quite likely, if stimulus B appears."

More generally, two classes of models for EC have been proposed: association formation models (e.g., Jones et al. 2009) and propositional models (De Houwer 2007, Mitchell et al. 2009). Association formation models presume an automatic process that generates a simple association between US and CS, linking the valence of the US to the CS. According to one recent account, the new evaluation of the CS may thus be understood as based on a misattribution of valence to the wrong stimulus. Propositional explanations of EC, on the other hand, claim that associative links may not be formed without the conscious assignment of validity tags (Mitchell et al. 2009). This divergence of views provoked a lively discussion across disciplines as different as cognitive neuroscience and philosophy, with some researchers endorsing the view that EC is a rather automatic process (e.g., Jones et al. 2009, Walther & Langer 2008) and others assuming that deliberative processing is essential to EC (Field 2005).

The evidence that speaks to the processes underlying EC effects appears to be mixed. One criterion that has been used to infer the associative nature of EC was its resistance to extinction: If the acquired (dis)liking of a CS is not affected by the subsequent experience (and resulting belief) that the CS no longer co-occurs with the (dis)liked US, then EC would represent an automatic, associative process. But whereas some researchers have shown EC to be resistant to extinction (Díaz et al. 2005), others—using a comparable procedure—have found extinction to occur (Lipp & Purkis 2005). In a similar vein, some researchers have found that awareness of a contingency between US and CS forms a necessary condition of EC effects (Pleyers et al. 2007), whereas others have reported EC effects that occurred in the absence of awareness (e.g., Field & Moore 2005; see also Dawson et al. 2007). Clear-cut conclusions are further compounded by the difficulty of unequivocally assessing contingency awareness.

According to a recent meta-analysis (Hofmann et al. 2010), the evidence for several moderators of the EC effect suggests the operation of higher-order mental processes rather than simple associative links. For example, effect sizes are larger when contingency awareness is high rather than low (but see Walther & Langer 2008, p. 88). Furthermore, children show lower levels of EC than do adults, although association formation as a largely automatic process should be fully functional at an early age. Also, EC effects are larger when self-report measures of liking rather than implicit measures are used. Still, there are studies showing reliable conditioning effects in children, under low contingency awareness, and for IAT measures of attitude, which points to the possibility that both associative processes and propositional reasoning contribute to producing EC effects.

To sum up, although it seems possible to frame almost any attitudinal evidence in terms of either a singularly associative *or* propositional process, a two-process account may be of greater heuristic value for the understanding of both attitude change processes in general and EC in particular. Instead of championing rival models, future research may benefit from focusing on the conditions that give rise to more associative versus propositional types of EC effects. A two-process account may also provide a better explanation for distinct result patterns on explicit versus implicit measures of attitude (Gawronski & Bodenhausen 2006, but see Kruglanski & Dechesne 2006), although additional indicators of mediating processes may be necessary for an unambiguous interpretation of findings, as attitude measures may usually reflect more than a single process.

Besides studying the underlying processes of implicit and explicit attitude change, the role of bodily states for attitude change has also received considerable attention in recent years. Although this research still lacks a strong

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theoretical background, some of the effects demonstrated in this area may expand our knowledge about attitude change and inspire new theory building.

Bodily States and Physical Perceptions in Attitude Change

People often express feelings and attitudes by metaphors based on concrete physical experiences: a warm reception; a clean solution; a dark hour. A growing body of research strongly suggests that such metaphors are not merely ornaments of everyday discourse, but also have a neural basis that links attitudes to physical perception, bodily responses, and movement. This may be illustrated by research on warmth, which has been identified as the most fundamental dimension in social judgment (Asch 1946, Cuddy et al. 2008). Williams & Bargh (2008) hypothesized that sensory experiences of warmth would increase feelings of interpersonal warmth, without the person being aware of that influence. In one of their studies, volunteers were asked by the experimenter to briefly hold a cup of hot (versus iced) coffee as they were on their way to the laboratory. Several minutes later, those participants who had held the hot cup judged an ambiguously described target person to be higher on traits implying warmth (e.g., as being more generous and caring) than did participants who had held the cold cup.

Not only do variations in physical temperature cause differences in evaluation, there is also evidence for a causal effect of valenced experiences on the perception of temperature. Specifically, in studies by Zhong & Leonardelli (2008), participants who recalled a social exclusion (versus inclusion) experience estimated the room temperature to be lower (experiment 1), and participants who were excluded (versus included) during an on-line ball-tossing game reported a greater desire for warm food and drink. Other demonstrations of embodied evaluative cognition include effects of physical distance on feelings of interpersonal closeness and of the vertical location of stimuli (high versus low) on their perceived valence (for a review, see Williams et al. 2009). Complementing these behavioral observations, there is also evidence that analogous physical and psychological dimensions are processed by the same regions of the brain (e.g., the insular cortex for both types of "warmth"; see Williams & Bargh 2008).

Bargh and his colleagues interpret the kind of effects reviewed in this section in terms of the automatic activation of applicable concepts. Participants in the Williams & Bargh (2008) study judged the target as warmer (or colder) because the physical experience of holding the hot (or cold) cup had made the concept of warmth (or coldness) more accessible outside of participants' conscious awareness. This explanation has several implications that have not been fully explored empirically to date. First, we should expect the effect to disappear or even reverse if the person is made aware of the (judgment-irrelevant) source of heightened accessibility and thus tries to correct for its influence, as has been shown for other types of concept priming in person perception (Strack et al. 1993) and for affective influences on evaluation (Bohner & Weinerth 2001, Schwarz & Clore 1983). Furthermore, contrast effects (e.g., judgments of lower warmth after experiences of high temperature and vice versa) should predictably arise depending on features of the judgmental task. Previous research has shown that contrast effects are more likely if the target is unambiguous and if the primed information is excluded from the target representation or is used as a standard of comparison or expectancy (e.g., Bohner et al. 2002; for a review, see Schwarz & Bless 2007).

In the domain of embodied evaluation, some of these factors were varied in a series of studies by Meyers-Levy et al. (2010). Their participants evaluated consumer products (e.g., a vase) while standing either on a soft carpet or on hard tiles. When the product was placed moderately far (five feet) away, so that only a vague impression of it could be formed, its evaluation was assimilated to the feelings of comfort provided by the flooring; however, when the product was physically close (six inches away) and thus a clear

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impression of it could be formed, its evaluation was contrasted away from the level of comfort provided by the flooring. These effects of the flooring disappeared in another set of conditions where participants were made aware of the potential influence of the flooring (experiment 2) or where an analytic mode of evaluation was primed (experiment 3). We expect that future research will reveal more evidence for situationally malleable effects of embodied sensations on attitudinal judgment (for a review of work on embodied cognition in persuasion, see Briñol & Petty 2008).

An embodied account to mere-exposure effects (Topolinski & Strack 2009) points to the mediating role of covert movement. Specifically, repeated exposure of a stimulus is thought to cause motor responses associated with that stimulus to be simulated. Blocking the specific motor response should thus reduce mere exposure effects. In line with this hypothesis, Topolinski and Strack found that chewing gum or silently repeating an unrelated word during the evaluation of stimuli destroyed mere exposure effects for words but not for Chinese ideographs. Conversely, humming ("mm-hm") during exposure and evaluation destroyed mere exposure effects for melodic stimuli but not for verbal stimuli.

In sum, a variety of studies in attitude research points to mutual links between bodily sensations and evaluation. This development is mirrored in other areas of social psychology as well as the discipline of psychology more generally. A fascinating collection of target articles and peer commentary on "roadmaps for an embodied social psychology" recently appeared in a special issue of the *European Journal of Social Psychology* (2009, Vol. 39[7]); this collection shows emerging integrative theorizing relevant to the domain of attitudinal processing (e.g., Williams et al. 2009) and beyond (see Schubert & Semin 2009).

Persuasion

Persuasion may be defined as the formation or change of attitudes through information processing in response to a message about the attitude object (Bohner et al. 2008b). Persuasion research of the 1980s and 1990s was guided mainly by two dual-process models, the ELM (Petty & Cacioppo 1986) and the heuristic-systematic model (HSM, Chaiken et al. 1989). These models' core assumption of distinct low-effort and high-effort modes of persuasion was later challenged by a single-process account, the unimodel (Kruglanski & Thompson 1999).

Embodied cognition: the idea that the body contributes to the acquisition, change, and use of attitudes

HSM: heuristic-systematic model

Two processes or one? One of the key points in the debate about dual- versus single-processing accounts was whether specific types of information (e.g., cues external to the message such as source expertise versus arguments contained in the message) should conceptually be linked to qualitatively different types of process (e.g., heuristic processing versus systematic processing). Suggesting such a conceptual link, most empirical tests of the dual-process models have relied on source attributes (e.g., expertise, likability) to operationalize cues and on variations in message content to operationalize arguments (see Kruglanski & Thompson 1999). Although proponents of the dual-processing approach have pointed out that a given variable can play multiple roles in persuasion, including that of a peripheral cue and that of a content argument (e.g., Petty & Wegener 1998), the unimodel more radically proposes that there is no theoretically relevant difference between such information types at all. Instead, any persuasive evidence (a source cue, a message argument, a feeling associated with an attitude object) may vary on a continuum of processing difficulty. Evidence that is easier to process (e.g., because it is short, of low complexity, salient, or presented early) has a higher likelihood of influencing attitude judgments at lower levels of processing effort, whereas evidence that is more difficult to process (e.g., because it is lengthy, complex, obscure, or presented late) requires a higher level of processing effort to influence attitude judgments (Kruglanski et al. 2007).

Researchers have meanwhile accumulated an impressive body of supporting evidence for

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Meta-cognitions: people's thoughts about their own thoughts or thought processes

the unimodel (for a review, see Kruglanski et al. 2007). In the remainder of this section, rather than dwelling on the controversy between dual- and single-processing approaches, we focus on their commonalities and point out ways in which the two approaches can be integrated to generate new predictions about persuasion as a sequential process. Then we address a recent trend in persuasion research that has extended and enriched the information-processing perspective shared by ELM, HSM, and unimodel: the consideration of meta-cognitions.

Integrating ideas from the dual- and single-processing perspectives. ELM, HSM, and the unimodel share a number of assumptions (for recent comparisons of the models, see Bohner et al. 2008b and Maio & Haddock 2009, pp. 96–105). All three assume that a message recipient's cognitive activities may be mapped onto a continuum of processing effort. Because cognitive resources are limited, people cannot process in depth the details of every persuasive message they receive. Generally, the amount of processing effort expended is determined by an individual's motivation and ability to process a given message.

Importantly, the models share the idea that early information can bias the processing of subsequent information when the individual has sufficient motivation and capacity to process the latter after processing the former. Within the dual-process models, the biased processing hypothesis was asymmetrical: Heuristic or peripheral cues were seen as capable of biasing the subsequent processing of message arguments, but not vice versa (e.g., Chaiken et al. 1999, Petty et al. 1999). However, the main reason for this asymmetry was of a methodological nature: Because cues were typically presented before the message, it made little sense to ask whether the processing of cues might be biased by the processing of arguments. The unimodel explicitly removed this constraint on the processing sequence, allowing the question of whether any type of early information might bias the processing of any type of information presented later in the persuasion sequence.

In unimodel terms, early information may increase the accessibility of certain inferences that then serve as a basis for interpreting subsequent information. Two experiments by Erb et al. (2007) put this idea to the test. In the first experiment, students received a message promoting a tunnel-building project that consisted of six arguments. The initial argument was either strong or weak, whereas the five subsequent arguments were all moderately persuasive. Students in a low-motivation condition were simply asked to form a general impression of the text, whereas students in a high-motivation condition were admonished to make informed decisions because they would later be interviewed about them. Results showed that participants generally reported more favorable attitudes toward the tunnel project after receiving a strong rather than weak initial argument, but how this effect was mediated depended on their level of motivation. Under low motivation, recipients used the initial argument as a shortcut to an attitude judgment (showing what would be termed a "cue effect" in dual-process models). Under high motivation, the quality of the initial argument biased the processing of the subsequent arguments, and this biased processing mediated the effect of the initial argument on attitude judgments. In their second experiment, Erb and colleagues found that an initial argument's quality was also capable of biasing the processing of subsequent source-related (i.e., cue) information, which in turn led to biased attitude judgments in line with the initial argument.

Such results point to the processing sequence as a previously unconsidered factor in research on biased processing (but see Erb et al. 1998). They also demonstrate that the processing sequence matters more than the type of information in determining persuasion outcomes. Arguments may serve as biasing factors (just like cues in previous dual-process studies), and cue information may serve as the information to be biased (just like arguments in previous dual-process studies), supporting the unimodel's notion of functional equivalence of cues and arguments.

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Biasing influences of the kind just described represent only one way in which pieces of information may jointly affect attitude judgments in a processing sequence. Within the HSM framework, researchers have proposed more varied assumptions on the interplay of heuristic and systematic information processing; these assumptions were called the additivity, attenuation, bias, and contrast hypotheses (Bohner et al. 1995). According to the additivity hypothesis, heuristic cues and message arguments exert independent main effects on attitude judgments if their implications do not contradict each other (e.g., a likable communicator presenting convincing arguments). The attenuation hypothesis posits that the processing of message arguments often yields more, and subjectively more relevant, information than the processing of heuristic cues, such that any additional effects of the latter may become undetectable. Both the bias and contrast hypotheses predict a statistical interaction between heuristic cues processed early and arguments processed later in the persuasion sequence. The bias hypothesis posits that the interpretation of mixed or ambiguous arguments is assimilated to initial cue-based inferences, whereas unambiguous arguments are not subject to such biased assimilation. According to the contrast hypothesis, arguments may be interpreted in a direction opposite to cue-based expectancies if such expectancies are clearly contradicted (e.g., a knowledgeable majority presenting weak arguments; Bohner et al. 2008a).

Persuasion as a sequential process. Recently, Bohner et al. (2008b) have examined how these hypotheses could be fruitfully integrated and expanded within the broader unimodel perspective to provide a generalized understanding of persuasion as a sequential process. They proposed that any interactive effects of the bias or contrast type require that early information is somehow related to subsequent information, whereas additive effects would be the rule whenever there is no relation between pieces of information. Bohner and colleagues defined relatedness as being present whenever the processing of early information activates inferences that serve as input to judging the evidential quality of subsequent information. The sequence in which information is presented would thus affect persuasion outcomes only in the case of related information, and not in the case of unrelated information. The discussion in this section does not refer to stage models of persuasion claiming qualitatively different processing stages (for a recent example and review, see Albarracín 2002); instead, we focus more specifically on effects of the sequence in which information is presented to a message recipient.

This approach may be applied to understanding the effects of two-sided persuasive messages (for a review, see Eisend 2007). Such messages are often particularly convincing if the pro and contra arguments that they contain are "correlated" (versus "uncorrelated") in the recipient's mind (Pechmann 1990). Research has shown, for example, that an advertising message mentioning a restaurant's cozy atmosphere (a pro argument) and small guest room (a contra argument) led to more positive evaluations of the restaurant than a one-sided message mentioning only the cozy atmosphere; this was especially the case when recipients had ample time to process the message (Bohner et al. 2003). In this research example, recipients' prior belief that "small means cozy," together with the presentation sequence "first pro argument, then contra argument," created a positive interpretation of the otherwise negative information about the small guest room, thus enhancing the argument about coziness. Although sequence effects have not been studied for correlated two-sided messages, the advantage of the two-sided message should be less strong if the contra argument were presented before the pro argument (in spite of the fact that a contra-pro sequence may correspond better to conversational norms; see Igou & Bless 2003). The use of counter-arguments in a two-sided message paradigm may yield particularly strong evidence for an interplay between pieces of persuasive information, because the otherwise negative effect of the

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counter-argument is turned into a positive effect by the presentation sequence.

Another way in which early information may be related to subsequent information is by eliciting a favorable or unfavorable "first impression" about the quality of a message. In a study by Bohner et al. (2002), recipients made initial inferences about argument quality based on perceived source expertise. These initial inferences either caused biased processing and attitude judgments in line with perceived source expertise (when arguments were ambiguous) or contrasting interpretations and attitude judgments opposite to perceived source expertise (when argument quality contradicted initial perceptions of expertise). Again, effects like those observed by Bohner and colleagues would not be obtained if source information were presented after message arguments. Similarly, if early information does not activate any inferences that are applicable to the interpretation of subsequent information, neither biased processing nor contrast effects would occur (see Bohner et al. 2008a). Early inferences may thus strongly affect subsequent processing if pieces of information in the persuasion sequence are related to each other.

For future theorizing and research, it will be necessary to characterize more clearly the concept of relatedness and the conditions giving rise to biased assimilation versus contrast effects. Also, a model of persuasion as a sequential process would benefit from incorporating assumptions regarding the mutual influences that associative and propositional processes exert on each other, as outlined in the APE model (Gawronski & Bodenhausen 2006).

Meta-cognitions in persuasion: The self-validation model. Following up on the idea that attitude change is mediated by cognitive responses that the recipient of a persuasive message actively generates (see Petty et al. 1981), a recent line of persuasion research has emphasized a special type of meta-cognitions: self-validating cognitive responses (Briñol & Petty 2009). Complementing other meta-cognitive approaches that have highlighted, for example, the role of affective experiences, ease of retrieval, or processing fluency (for a review, see Schwarz & Clore 2007), Briñol & Petty (2009) focus on people's thoughts about their own cognitive responses to a persuasive message. These meta-cognitive thoughts should be particularly influential at high levels of motivation and processing ability (see our discussion of single- and dual-processing models above). Briñol & Petty's central idea is that persuasion effects are determined not only by the valence of first-order cognitive responses, but also by the confidence that people place in these cognitions. At higher levels of confidence, favorable thoughts should lead to more positive attitudes, and unfavorable thoughts to less positive attitudes, than at lower levels of confidence.

This moderation hypothesis has been shown to account for some classic persuasion effects, but it also provides a framework for understanding novel phenomena. To illustrate, variations of source credibility directly affect thought confidence, in that people trust their cognitive responses to a message more if this message comes from a high-credibility source. This heightened confidence leads to more positive attitudes if recipients' cognitive responses are favorable (as in the case of strong arguments) but to more negative attitudes if recipients' cognitive responses are unfavorable (as in the case of weak arguments) (Tormala et al. 2006). Interestingly, Tormala et al. (2007) showed that information about source credibility affected thought confidence primarily when it followed the persuasive message, thus facilitating a retrospective validation of cognitive responses already generated; by contrast, when source information preceded the message, it led to biased first-order cognitive responding, in line with research we discussed above (e.g., Bohner et al. 2008a).

Briñol & Petty (2009) discuss further examples of how classic persuasion variables related to source, recipient, message, and context may affect persuasion outcomes via their impact on thought confidence (pp. 79–99). They also applied their framework to explaining new mechanisms of personal relevance, showing that people's attitudes were more strongly affected by

their thoughts if these thoughts were seen as originating from the self (as opposed to being culturally determined; Briñol & Petty 2009, pp. 101–102). Finally, they reviewed effects of thought confidence on attitude ambivalence, showing that the overall sense of ambivalence could be either reduced or increased by enhancing people's confidence in just one side or both sides of their ambivalent reactions, respectively (pp. 99–101).

In sum, the approaches and findings discussed in this section on persuasion form extensions of the cognitive response approach and of existing processing models of persuasion. They shed new light on old phenomena and have the potential to generate new hypotheses in the still thriving area of persuasion research. Given that they deal with intentional, propositional reasoning (about the relations between pieces of a message or about the meaning of one's own thoughts), in the future they may also enrich our understanding of the interplay of associative and propositional processes (see Gawronski & Bodenhausen 2006).

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CONSEQUENCES OF ATTITUDES

Among the oldest reasons why attitudes are so prominent in social psychology is the conviction that attitudes guide information processing and influence behavior. Allport (1935) asserted that attitudes determine what people see, hear, think, and do, and called attitudes "our methods for finding our way about in an ambiguous universe" (p. 806). The following sections are devoted to selected studies from the wide area of attitudinal effects on information processing and behavior that have produced exciting new findings in recent years.

Attitude Effects on Information Processing

We first focus on the effects that a perceiver's own attitudes may have on information processing: Do people generally expose themselves selectively to information that confirms their attitudes (Frey 1986), and if so, why? Then we highlight the effects that knowledge about other people's attitudes may have on information processing: When a person communicates about an object, how does the presumed audience attitude affect his or her memory for and subsequent evaluation of the object (Echterhoff et al. 2009a)?

A new look at selective exposure. A core assumption of the theory of cognitive dissonance (Festinger 1957) is that people are motivated to maintain consistency of their cognitive structure. People should thus predominantly seek out and pay close attention to new information that confirms their existing attitudes (congenial information) and avoid information that might contradict their attitudes (uncongenial information). This idea was investigated by asking participants first to make an evaluative decision and afterward to choose additional information that might either confirm or disconfirm their initial attitude. In a classic selective exposure paradigm, for example, participants read a description of a court case and decide whether the suspect is guilty or not guilty of murder. Then participants get an opportunity to examine additional information on the case. Each piece of information is clearly labeled by a core argument or summary description so that participants know whether it supports or questions their previous decision, and participants are asked to select those pieces that they want to examine in detail (e.g., Sears 1965). In a recent meta-analysis of such studies conducted predominantly in the past ten years, Hart et al. (2009) found a moderate overall preference for congenial over uncongenial information. This confirms an earlier qualitative review by Frey (1986). Research has shown that the selective exposure effect is moderated by attitude strength: The stronger a person's attitude on an issue, the more likely he or she is to select attitude-congruent information (Brannon et al. 2007). Hart and colleagues (2009) also found the congeniality bias to be moderated by people's motivation: Participants showed a pronounced congeniality effect when they were motivated to defend their attitudes but showed

a more even-handed selection pattern when they were motivated to reach a high level of accuracy.

In contrast to this motivational account for selective exposure effects, a recent view emphasizes that variations in the preference for congenial information may be caused by nonmotivational cognitive processes as well (S. Schulz-Hardt, P. Fischer & D. Frey, unpublished manuscript). These authors offer a selection-criteria explanation, postulating that people aim to differentiate best between the available pieces of information and to do so with the least processing effort possible. Besides information direction, they argue, the selection criterion that differentiates best is information quality (Fischer et al. 2008, p. 233). Importantly, people's attitudes lead them to attribute higher quality to congenial information than to uncongenial information (e.g., Chaiken et al. 1996), which should lead to a preference for congenial information even in the absence of a cognitive consistency motive, when the main selection criterion instead is maximizing information quality.

In their study, Fischer et al. (2008) experimentally manipulated the selection criteria for the search of information. When participants chose among additional pieces of information, they were prompted to focus either on the direction of information (i.e., congenial versus uncongenial) or on the quality of information. Interestingly, when participants were encouraged to focus on the direction of information, the usual pattern reversed into a preference for uncongenial information. In terms of a classic dissonance account, however, this manipulation should have enhanced the congeniality bias rather than diminished it because it should have rendered the means to achieve cognitive consistency more salient. Conversely, when participants were encouraged to focus on the quality of information, they showed the typical congeniality bias. Thus, congeniality bias in such a setting in fact seems to be mediated by the higher perceived quality of attitude-confirming information.

Further evidence in favor of the selection-criteria account of selective exposure effects comes from a study by Fischer et al. (2005, experiment 3). Participants first evaluated a manager's job performance and then chose 6 out of 12 statements providing further information. Half of the participants were simultaneously put under cognitive load; they performed an auditory concentration task as they were selecting the written statements. These participants did not show any congeniality bias, whereas participants who did not have to perform the auditory task did show a significant congeniality bias. The finding that confirmation bias is blocked when processing capacity is low suggests that a preference for attitude-consistent information does not occur automatically and depends on ample processing resources.

For future research it could be fruitful to examine whether motivational and cognitive explanations of selective exposure might complement each other. Indeed, the selection-criteria account does not rule out the possibility that motivations may sometimes produce selective exposure effects, and this is true for both defense and accuracy motives (S. Schulz-Hardt, P. Fischer & D. Frey, unpublished manuscript). When the topic is highly self-relevant and threatening, defense motivation may come into play—e.g., when smokers selectively attend to messages denying a causal relation between smoking and lung cancer (Brock & Balloun 1967). But accuracy motivation may also increase rather than mitigate a congeniality bias, as was shown by Schulz-Hardt and colleagues, whose participants showed a stronger bias when they were given an incentive for correct judgments (S. Schulz-Hardt, P. Fischer & D. Frey, unpublished manuscript, experiment 3). One practical implication of these findings is that interventions aimed at reducing bias should not rely on incentives for accuracy; instead, it might be more promising to ask people to consider the information from a perspective other than their own (also see Hirt & Markman 1995). After considering the effects of an individual's own attitudes, we now turn to effects that other

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people's attitudes can have on our cognitions in social interaction.

Interpersonal effects: Attitude-based audience tuning and memory. When communicating about an object, people often take into account the audience's attitude toward the object, "tuning" the valence of their messages to match that attitude. These tuned statements may then influence the communicator's memory representation and impression of the object. This saying-is-believing (SIB) effect was first shown by Higgins & Rholes (1978). In a typical experiment, a participant (the sender) receives evaluatively ambiguous information about the target of communication (usually another person). The participant is then asked to produce a written communication about the target that is directed at a third person or group (the audience) in such a way that the audience will be able to identify the target from among a group of people they know. The central experimental manipulation consists of information about the audience's attitude toward the target, which the sender is led to perceive as either positive or negative. Later the sender is asked to recall the original information about the target as accurately as possible (and sometimes to evaluate the target). A typical finding is that not only the messages are tuned to the perceived audience attitude, but moreover the sender's memory of the target is evaluatively biased in line with the sender's message—and, hence, the audience's attitude (for a review, see Echterhoff et al. 2009a).

Recent studies have shown that the SIB effect is moderated by several factors that point to the social sharing of reality as the common mediating mechanism (Echterhoff et al. 2005). The more that senders trust in the audience's attitude as an appropriate reflection of reality, the closer their messages and the valence of their memory correspond to that attitude. Accordingly, more pronounced SIB effects have been found for in-group audiences than for out-group audiences (Echterhoff et al. 2005) and for equal-status audiences than for higher-status audiences (Echterhoff et al. 2009b). Apparently, an equal-status audience, although lacking domain-specific expertise, qualifies as a more trustworthy partner in creating a shared reality (Echterhoff et al. 2009b). The SIB effect also generalizes to communication about social groups as targets; this finding provides further evidence for a shared-reality interpretation of the effect and suggests a potentially important mechanism underlying the formation of prejudiced attitudes (Hausmann et al. 2008).

SIB: saying-is-believing effect (shorthand expression for the effect that tuning a message to an audience's attitude may alter the sender's memory and evaluation of the message topic)

A general framework for understanding social influences on memory was proposed by Blank (2009). He assumes that social cues may influence memory at three stages. (*a*) When memory for an object or event is accessed, it may be constructed (just like an attitude) from the information that comes to mind. At this stage, social factors like the (imagined) presence of another person may render some aspects more accessible than others, resulting in a tuned memory construction. (*b*) After the information has been accessed, the individual tries to validate whether it is a correct representation of the object or event in question. At this stage, other people's attitudes may play a crucial role, as the individual is more likely to accept as valid those remembered aspects that match the opinion of experts or the majority. (*c*) Then the individual may communicate the presumably valid memory content. At that stage, the message may again be tuned to the perceived audience attitude, affecting subsequent recall and impression formation. That audiences' attitudes may play a role at different stages of memory processing was illustrated in a study by Kopietz et al. (2010), who showed that the SIB effect on memory was equally strong whether information about the audience's attitude was presented before participants encoded the target information or afterward (but before generating their message).

We note some similarities between the social memory model by Blank (2009) and the assumption of associative (access-stage) and propositional (validation-stage) processes in attitude change (Gawronski & Bodenhausen 2006). Both memories and attitudes may be constructed from accessible information, both

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may come about through an interplay of automatic activation and more effortful validation, and the communication stage in research on SIB may be seen as corresponding to the reporting of attitudes, which is malleable by self-presentation or other social motives (see **Figure 3**). These parallels may offer the potential of further integrating research on social memory and evaluation. Having highlighted two aspects of attitudinal influences on information processing, we turn—last but not least—to effects of attitudes on behavior.

The Implicit-Explicit Distinction and the Prediction of Behavior

The ways in which attitudes predict behavior form a long-standing research topic in social psychology (for a review, see Glasman & Albarracín 2006) that has strongly influenced applied areas (see, e.g., Stock & Hoyer 2005). Recent theories suggest that implicitly and explicitly measured attitudes predict different types or aspects of behavior (Petty et al. 2009, Wittenbrink & Schwarz 2007). Indeed, both implicit and explicit measures of attitude show substantial correlations with attitude-relevant behavior (for a meta-analytic review, see Greenwald et al. 2009). Attitude-behavior correlations were generally found to be higher for explicit measures, but implicit measures often showed incremental validity, explaining variance in behavior over and above what is explained by explicit measures (e.g., Richetin et al. 2007).

Importantly, there are particular domains where implicit measures fared better in predicting behavior: These include socially sensitive topics such as intergroup prejudice and discrimination (Greenwald et al. 2009), where behavior (e.g., hiring recommendations for black versus white applicants; Ziegert & Hanges 2005) was often more strongly predicted by the IAT than by explicit self-report measures. Furthermore, both IAT and self-report measures were more highly correlated with behavior when the intercorrelation of the two types of attitude measure was high (as in the domains of political and consumer attitudes) rather than low (as in the domains of intergroup behavior or close relationships). Greenwald and colleagues (2009) interpret this joint evidence for discriminant and convergent validity of implicit and explicit measures as an argument for positing dual constructs of explicit and implicit attitude, although the evidence would also be compatible with a view of distinct processes (e.g., comprising variations in motivation or processing opportunity) operating on a single type of structural attitude representation (Fazio & Olson 2003).

A more continuous view may also be taken in regard to the behaviors that are more or less well predictable by explicit or implicit measures. Rather than comparing qualitatively distinct behavioral domains, some researchers have shown that the same observable behavior may be better predicted by either implicit or explicit measures depending on the circumstances. For example, Friese et al. (2008b) showed that problematic behaviors whose intentional regulation requires a certain amount of conscious control, such as eating high-calorie foods or drinking alcoholic beverages, are better predicted by explicit attitude measures when control resources are available, but are better predicted by implicit measures when control resources have been experimentally depleted (see also Gibson 2008, experiment 2). A recent review of the conditions that moderate implicit attitude measures' prediction of behavior was provided by Friese and colleagues (2008a).

In sum, research on attitudes as precursors of behavior, like other areas, has also been extended in recent years by the joint application of implicit and explicit measures of attitude. Applied researchers as well, whose aim is often to optimize prediction and find interventions for enhancing desired behaviors and reducing undesired ones, should benefit from this greater breadth of approaches.

CONCLUDING REMARKS

Attitudes continue to be one of the most important concepts of social psychology and attitude research one of its most active areas.

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The past decade of attitude research was characterized by integrative theorizing, which had been prompted by the introduction and rising popularity of implicit measures of attitude. These new methods spurred active debates about the optimal conceptualization of attitudes and about the interplay of cognitive processes in attitude formation and change. Our aim in this review was to delineate the main theoretical developments of the past five years resulting from this development and to point out some exciting new lines of investigation. In doing so, we had to be selective, so several issues were hardly covered at all—these include areas that figured prominently in previous reviews of this series (e.g., persuasion by majorities and minorities; see Martin & Hewstone 2010). Nonetheless, we hope that we have provided readers with a critical overview and some starting points for further reading in this fascinating field.

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SUMMARY POINTS

1. Attitude definitions characterize attitudes as either constructed on the spot from accessible information or as stable entities that are stored in memory. The two types of definition draw on different lines of evidence to account for attitudes' context sensitivity versus stability over time.
2. For a long time, attitudes were measured mainly by explicit self-report scales, but recent years have been marked by an increasing popularity of implicit, response-time-based measures.
3. Correlations between implicit and explicit measures of a given attitude may vary; similarly, change on implicit measures is not always accompanied by change on explicit measures, and vice versa. To explain this variability, researchers have developed models that (*a*) allow for dual (or multiple) attitude representations and (*b*) distinguish between associative and propositional processes that are assumed to underlie these representations.
4. Whether associative and propositional processes are theoretically separable is being debated; this may be illustrated by controversies around the optimal conceptualization of evaluative conditioning.
5. Attitudes are closely linked to bodily sensations such as temperature or motor perceptions; these sensations can render evaluative information about an attitude object more accessible and result in a different overall judgment.
6. New developments in persuasion research suggest that (*a*) assumptions from traditional dual- and single-process models of persuasion may be integrated into a general model of persuasion as a sequential process, and (*b*) meta-cognitions (i.e., people's thoughts about their own cognitive responses to a persuasive message) may moderate the impact of other persuasion variables.
7. Attitudes affect information processing. A person's motivation to select high-quality information in combination with an attitude-congruent bias in the perception of information quality may cause selective exposure to information. In social interaction, people tune their messages to audiences' attitudes, which ultimately results in biased recall and biased evaluation of the message topic.

8. Attitudes affect behavior. Research on attitudes as precursors of behavior shows that implicit measures of attitude predict spontaneous, less controllable behavior, whereas explicit measures of attitude predict deliberative, more controlled behavior. Jointly, implicit and explicit measures of attitude may improve the overall prediction of behavior.

FUTURE ISSUES

1. Research on the effects of bodily states on attitudinal processing needs to be extended to explore the full range of assimilation, contrast, and conscious correction effects that have been observed in other areas of priming and social judgment.
2. The idea that persuasion forms a sequential process in which the processing of early information may affect the interpretation and use of subsequent information should be further specified; in particular, the concept of "relatedness" of information and the conditions of assimilation versus contrast in sequential processing need to be delineated.
3. Future research should explore how motivational and cognitive explanations may be combined to yield a more complete understanding of selective exposure to attitude-congruent information.

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