

## Chapter 11

# *Attitudes and Persuasion*

## From Biology to Social Responses to Persuasive Intent

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This [attitude] concept is probably the most distinctive and indispensable concept in contemporary American social psychology.

—Allport (1935)

One of the authors of this chapter recently commented to a colleague, “If I read one more paper that opens with that Allport quote about attitude as the ‘most distinctive and indispensable concept’ in social psychology, I’m probably going to scream.” *The Allport Quote* is used in empirical articles, book chapters, conference presentations, handbooks, and lectures worldwide. Alas, here we are, opening with *The Quote*. Why? Because Allport’s claim is as profoundly true today as it was when he first wrote it more than 70 years ago.

Despite being almost a cliché, *The Quote* can be used to illustrate several important, basic points about attitudes. First, attitudes are evaluations: one of us expressed an attitude—an intense dislike of clichés (which, forgive us for being hypocritical, may unintentionally emerge in our writing). Second, attitudes are important because we hold them toward a variety of different objects—people, places, things, ideas, actions, and so forth. Third, attitudes continue to be at the center of social psychology because they are complex and difficult to study. We may like some aspects of an attitude object, but not others (*The Quote*, itself, is good; its overuse is bad). Fourth, attitudes keep us interested because they may be measured and expressed in a variety of ways—behaviorally, affectively, cognitively, implicitly, and explicitly. Fifth, attitudes are formed and changed in a variety of different ways, with varying amounts of cognitive deliberation (e.g., repeated exposure to stimuli may be outside of conscious awareness or subject to careful cognitive deliberation) and awareness of

the source of change. These basic claims about attitudes are relatively uncontested but represent only a tiny fraction of the extant research on attitudes and persuasion.

Not surprisingly, the complex nature of attitudes has intrigued scholars for several millennia, often in the context of persuasion. Aristotle, for example, defined *rhetoric* as the “art of discovering, in a particular case, the available means of persuasion.” In his view, speakers use their personal character to make their speech credible (*ethos*), stir emotions in their audience (*pathos*), and prove a real or apparent truth by means of persuasive arguments (*logos*). Because of this combination of power, emotion, and argumentation, Aristotle was quite disapproving of many of the persuasive messages used by the sophists of his day. In modern times, social psychologists have studied similar phenomena but have often replaced disdain with admiration for the human ability to elicit compliance without a need for coercion.

Politicians were on the radar for Aristotle and remained there for contemporary scientists interested in persuasion. Psychologists developed experimental methods for studying persuasion during the first part of the 20th century when events leading up to World War II made the experimental study of persuasion a topic of paramount importance. Following the practices of the Roman conglomerate, both Lenin and Stalin set in motion political and social propaganda that controlled and unified an empire of otherwise divided nations that shared no cultural heritage. Millions of consistently designed posters from the Soviet era survive as a testament of a brilliantly orchestrated persuasion

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machine. And, of course, the Soviet propaganda inspired Hitler's ministers to systematically persuade German citizens of various aspects of Nazi ideology, including the need to isolate and exterminate "undesirable" ethnic groups.

Social psychologists started to methodically study persuasion in an attempt to understand how to create American propaganda that could be as effective as the Bolsheviks' and the Nazis', though this time in the service of honorable values. During the 1950s and 1960s, Yale University Professor Carl Hovland received government funding to identify methods to strengthen and maintain American troops' morale. Some of these methods may still be used on U.S. troops, but Hovland's theory of persuasion has probably been more long lasting. According to Hovland and Weiss (1951), a message is persuasive when it provides recipients with some concrete or symbolic reward. For example, recipients are more persuaded by a credible, trustworthy, or attractive communicator because approval by such sources is intrinsically rewarding.

The theory of persuasion put forth by Hovland and his collaborators was gradually replaced by theories of the cognitive processes that accompany persuasion. Attentive message recipients are rarely passive consumers. They tend to be cognitively active: processing and transforming information, and generating their own take on it (Brock, 1967; Greenwald, 1968). A message may state that President G. W. Bush was an effective commander-in-chief, but critical message recipients may be overwhelmed by their recollection of evidence to the contrary. Message recipients have been also known to engage in different forms of processing that different psychologists term "systematic," "peripheral," "elaborative," "associative," and so on. These persuasion processes are an important consideration in this chapter, as are the psychological evaluations that result from mere observation of environmental events (e.g., an object that produces positive consequences).

The study of attitudes in persuasion and other contexts, however, would be incomplete if we ignored the fact that our evaluations are also shaped by biology. Many of the methods to study these correlates have become more widely available in recent decades, and methods that did not exist in prior decades can now be used to study attitudes. This chapter also makes reference to lines of inquiry related to the brain correlates of attitudes and connections with the biological bases of personality as studied in the fields of personality psychology and behavior genetics.

## DEFINING ATTITUDES

There is no need of social psychological research to appreciate the astonishing diversity of human attitudes.

Different individuals and social groups vary in their food preferences, their endorsement of women's participation in political and work life, and their preferences for different forms of art. Beyond a basic enjoyment of babies, national symbols, and sweet tastes, there seems to be more attitude variance than invariance. Over the course of many decades, similar observations have fueled a quest for knowledge about environmental influences on individuals' likes and dislikes. Moreover, in recent years, we have learned more about the interaction between environmental influences and the biological and genetic bases that shape attitudes. This edition of the *Handbook of Social Psychology* arrives at a time when this realization is acute.

*Attitudes* are implicit or explicit object evaluations and, therefore, have implications for all areas of social life. This chapter describes attitudes as stemming from biological and environmental sources (cf. "nature" and "nurture"), as depicted in Figure 11.1. Biological sources entail the genetic and biological bases of general patterns of affective valence and arousal. Environmental sources may be either active or passive, and influence affective, cognitive, and behavioral responses. A seemingly passive environment triggers cognitive processes that often, but not always, require little attention to or involvement with the attitude object. A seemingly active environment can elicit those same processes but entails awareness of influence intent and may arouse corresponding defense mechanisms (e.g., resistance and reactance). For example, if you observe that an object has positive attributes, this rarely leads you to resist liking the object; however, receiving a call from a telemarketer who tries to persuade you to donate money to the Atlantic Paranormal Society does tend to generate resistance to persuasion. The cognitive processes elicited when people are and are not aware of influence attempts are the subjects of this chapter.

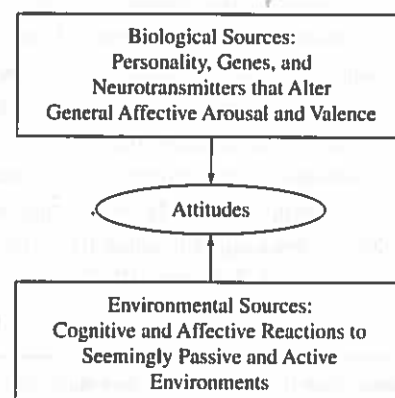


Figure 11.1 Sources of attitudes.

### BIOLOGICAL SOURCES OF ATTITUDES: HOW BIOLOGY AND GENES INFLUENCE AFFECTIVE VALENCE AND AROUSAL

There is a kernel of truth to the “snips and snails, and puppy dogs’ tails” versus “sugar and spice, and everything nice” nursery rhyme. Boys and girls are different; they obviously differ biologically, and they also tend to differ attitudinally. But to what extent do biological differences influence psychological and attitudinal differences? From the 1960s to the 1990s, many physicians and psychologists believed that psychological sex differences were entirely socially constructed, that people were “psychosexually neutral at birth,” (Diamond & Sigmundson, 1997, p. 298). The heartbreaking case of David Reimer helped disprove that theory.

Reimer was born a boy who, at the age of 8 months, had his penis destroyed in a circumcision operation. As experts advised about the convenience of raising him as a girl, Reimer’s testes were removed at 22 months as part of a male-to-female sex “reassignment” effort. For years this case was reported in the popular media (using pseudonyms Joan/John) as a success; “Joan” was said to be successfully developing as a normal woman. “The effect[s] of such reports were widespread for theory and practice. Sociology, psychology, and women’s study texts were rewritten . . .” (Diamond & Sigmundson, 1997, p. 299) to suggest that genetic influences on psychological sex differences were minimal. The truth, though, is that Reimer’s childhood was far from normal. In terms of attitudes, young Joan was more like a John: s/he didn’t like makeup, expressed a desire to shave, preferred boys’ toys to girls’, liked to dress up in men’s clothing, enjoyed playing soldier, and preferred hanging around other boys.<sup>1</sup> Of course, we do not intend to suggest that psychosexual identity can be subsumed by the attitude concept, but this case overwhelmingly suggests that important biological influences on attitudes exist.

Biological influences on attitudes may be dramatically observed in unusual cases, such as Reimer’s, or where monozygotic twins have been separated near birth. Monozygotic twins share the same genetic material, so when they have been raised apart from one another they provide an excellent natural experiment for examining the influence of genes and environments on psychological characteristics. Such cases are quite rare, but a study of 100 monozygotic twins reared apart has been ongoing since 1979 (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990). On measures

of psychological interests, monozygotic twins reared apart obtained an average correlation of .41; monozygotic twins reared together averaged .49. On measures of social attitudes, monozygotic twins reared apart obtained an average correlation of .45; monozygotic twins reared together averaged .43 (Bouchard et al., 1990). Thus, substantial evidence has been reported that attitudes may be influenced by biology, but these studies address the issue at a molar level. Next, we consider biological influences on attitudes at more molecular levels, and we begin with a consideration of attitudinal structure and its relation to personality.

The structure of an attitude can be understood using models of affective feelings. A popular model of the structure of affect and emotions incorporates the dimensions of positive versus negative valence and high versus low arousal (Bradley, Codispoti, Cuthbert, & Lang, 2001; Russell, 2003; Smith & Ellsworth, 1985; for reviews, see Clore & Schnall, 2005; Schimmack & Crites, 2005). We may feel sad, angry, content, or excited, and these four states vary not only in their negative or positive valence but also in their associated arousal (Russell, 2003). Arousal has proved to be an elusive term but generally comprises autonomic activation and may be measured by changes in skin conductance, heart rate, or brain waves (see Bradley & Lang, 2007; Cacioppo, Berntson, & Crites, 1996). Feelings of anxiousness, tension, alertness, and excitement share high autonomic activation or arousal (e.g., high heart and breathing rate), whereas feelings of sadness and contentment share low autonomic activation or arousal (e.g., lower heart and breathing rate; somnolence).

Given that attitudes are valenced responses (positive vs. negative), they can also be mapped onto a model with valence and arousal as distinct dimensions. This model is graphically depicted in Figure 11.2. On the valence axis, individuals may dislike or like a presidential candidate, and may dislike or like a particular food. Furthermore, attitudes can be mapped onto the arousal dimension because they vary in importance, confidence, or the degree to which they elicit strong emotional responses such as excitement (see Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000; Fabrigar, MacDonald, & Wegener, 2005; Lang, Öhman, & Vaitl, 1988). For example, highly involving objects such as abortion, God, and marijuana legalization often trigger strong attitudes that are infused with feelings and connect to other important attitudes, such as self-esteem (the evaluations of oneself as a person; Eagly & Chaiken, 1993; Fabrigar et al., 2005). These attitudes are often reported as extreme when individuals complete attitude scales (Judd & Brauer, 1995), are held with high confidence (Abelson, 1988), are easy to recall (Judd & Brauer, 1995), and are fervently defended against external attacks (Johnson, Maio, & Smith-McLallen, 2005; Petty, Tormala, & Rucker, 2004).

<sup>1</sup> At age 14, Reimer chose to resume living as a male, and at 32, he chose to reveal his identity to help others avoid similar suffering. Tragically, Reimer committed suicide in 2004.

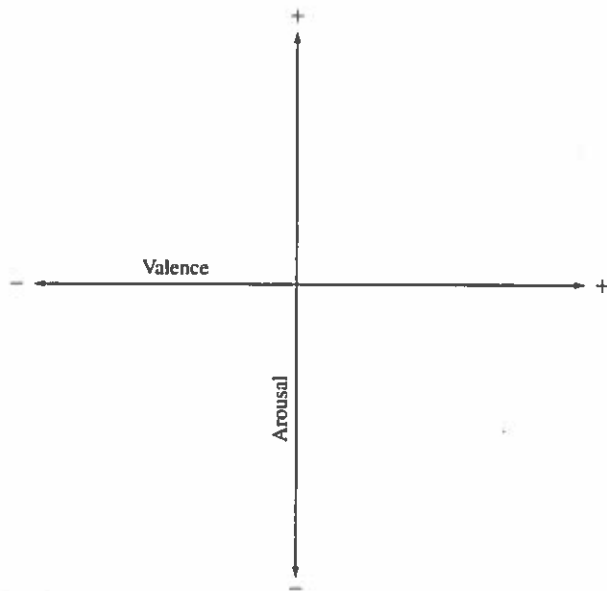


Figure 11.2 Dimensions of valence and arousal.

Adhering to a valence/arousal model does not require dogmatic adherence to a circumplex (see also Remington, Fabrigar, & Visser, 2000). For example, objects with extremely positive and negative valence are often important and generate high autonomic arousal (for a review, see Bradley et al., 2001). In this case, high positive and negative valences are associated with high arousal, whereas neutral valences are associated with low arousal. If one were to map objects onto independent valence and arousal dimensions, they probably would not be evenly distributed among all four quadrants but rather in a U-type of pattern (see Bradley et al., 2001; Remington et al., 2001; Figure 11.3). Nevertheless, these two dimensions have interesting applications in the attitude literature and connect with stable response patterns that are grounded in biology and genetics.

Interestingly, considerable research indicates that specific structures in the brain respond to stimuli in ways that suggest that valence and arousal are not easy to separate. In particular, the *amygdala*, an almond-shaped group of neurons located deep in the medial temporal lobes of the brain, plays an important role in evaluation (Hamann, Ely, Hoffman, & Kilts, 2002; Irwin et al., 1996). The amygdala is particularly engaged during affective judgments of emotional pictures, words, and odors (Cunningham, Raye, & Johnson, 2004; Phan et al., 2004; Royet, Plailly, Delon-Martin, Kareken, & Segebarth, 2003), when the target objects are negative (vs. positive) stimuli (Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003; Morris et al., 1996; Reekum et al., 2007), and when the stimuli have

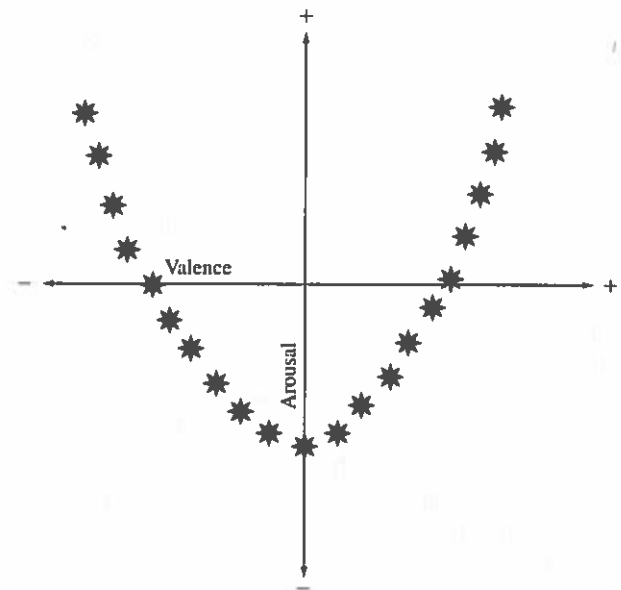


Figure 11.3 Hypothetical distribution of valence and arousal.

emotional meaning (Bechara, Damasio, Damasio, & Lee, 1999). Moreover, the amygdala is connected with the insula and the anterior cingulate cortex (ACC), and these three structures can collectively respond to both valence and arousal (Cunningham et al., 2004; Cunningham & Zelazo, 2007; Rempel-Clower, 2007; Wright et al., 2008). The visual cortex also appears to respond to both valence and arousal, as judged from a functional magnetic resonance imaging study revealing greater activation when participants viewed pleasant and unpleasant images, compared with neutral images (Lang et al., 1998).

### Personality as the Biological Core of Stable Valence and Arousal Patterns

Being stable patterns of feelings, thoughts, and behaviors (Allport, 1937; Cattell, 1946; McCrae & Costa, 2008; Mischel & Shoda, 2008), personality cuts across objects and times, and may influence and be influenced by specific attitudes. The general assumption, however, is that personality is, in part, biologically driven, and it is not difficult to see how personality connects with the valence and arousal dimensions in Figure 11.2. For example, Eysenck (Eysenck, 1967; Eysenck, Eysenck, & Educational and Industrial Testing Service, 1975) characterized personality as linked to biological and genetic factors manifested in the three major traits of neuroticism, extraversion, and psychoticism. Neuroticism is the disposition to experience negative affect, and it appears to be relatively stable over the lifetime (Eysenck, 1967; John & Srivastava, 1999).

This trait has been found to predict the onset of depression and anxiety (Angst & Clayton, 1986; Boyce, Parker, Barnett, Cooney, & Smith, 1991; Hirschfeld et al., 1989; Kendler, Neale, Kessler, Heath, & Eaves, 1993), and correlates with negative attitudes toward a variety of objects. For example, neuroticism reportedly correlates with feeling dissatisfaction after eating chocolate (Müller, Dettmer, & Macht, 2008), sexual guilt in both men and women ( $r = .31$  in both cases;  $p < .05$ ; Heaven, Fitzpatrick, Craig, Kelly, & Sebar, 2000), and women's dissatisfaction with sexual experiences ( $r = .36$ ;  $p < .05$ ; Heaven et al.). Neuroticism also correlates with negative evaluations of medical treatments and of physical symptoms ( $r = .14$ ,  $p < .05$ ; and  $r = .46$ ,  $p < .001$ ; Cox, Borger, Asmundson, & Taylor, 2000), as well as negative attitudes toward working with patients with AIDS ( $b = .21$ ,  $p < .001$ ; Knussen & Niven, 1999). Moreover, neuroticism has been linked to negative attitudes toward work (for a review, see Tokar, Fischer, & Subich, 1998), beliefs that work interferes with personal relationships (Mughal, Walsh, & Wilding, 1996), and perceived stress associated with work (Decker & Borgen, 1993; Spector & O'Connell, 1994). There are times, however, in which neuroticism correlates with positive attitudes. For example, despite the reported guilt elicited by eating chocolate, neuroticism is associated with favorable attitudes toward chocolate ( $r = .27$ ;  $p < .001$ ; Müller et al., 2008) as well as illicit substance use ( $r = .30$ ;  $p < .001$ ; Francis, 1996). Overall, these patterns suggest that neuroticism correlates with negative attitudes about all objects except for those that are instrumental to improving negative feelings (e.g., chocolate).

Although, by definition, neuroticism entails negative affect and consequently negative attitudes, neuroticism can also entail high levels of anxiety (Eysenck, 1967). Hence, the higher arousal of neurotics could influence attitude properties related to arousal. Up to now, however, almost no research has related neuroticism to attitude extremity or arousal. One exception to the absence of research in this area comes from an analysis of reactions to different types of advertisements. Over two studies, Mooradian (1996) found that, as one might expect, presenting positive and negative ads yielded, respectively, more positive and negative attitudes toward the ads (associations between neuroticism and attitude extremity for positive and negative ads, respectively,  $\beta = .10$  and  $.07$ ;  $p < .001$ ). Although preliminary, these results suggest a need to further research the relations between neuroticism and negatively valenced attitudes, and how neuroticism relates to sensitivity to valence, as well as attitude extremity and importance. Even when neuroticism is more likely to implicate valence than arousal, the effects of arousal should not be ignored.

Not surprisingly, traits predominantly related to arousal (e.g., extraversion/introversion, impulsivity) are also related to valence and purportedly have a biological substrate. For example, extraversion comprises sociability and risk taking but also optimism and is contrasted with introversion, which comprises introspection and reservation but also pessimism (Taub, 1998). Eysenck (1967, 1975) conceptualized extraversion as a result of "cortical excitation" and "inhibition" (see Pavlov, 1928), which was initially defined as the degree of engagement of the ascending reticular activating system of the brain (Moruzzi & Magoun, 1949), and later as resulting from a limbic-arousal system, a monoamine-oxidase system, and a pituitary-adrenal system (Eysenck, 1990a, 1990b). In summary, traits associated with arousal (and valence) have been linked to various biological systems that may also influence attitudes.

As a radical biological theorist of personality, Eysenck (1967) devoted intense effort to precisely tie extraversion to corresponding responses in a particular arousal system. For example, Eysenck proposed that deficits in arousal underlie extraverts' search for external stimulation (see also Eysenck & Eysenck, 1985; Ludvig & Happ, 1974; Shigehisa & Symons, 1973). Consistent with this hypothesis, past research has demonstrated that extraverts have lesser cerebral blood flow during resting states than do introverts (Fischer, Wik, & Fredrikson, 1997; Mathew, Weinman, & Barr, 1984). Although individual differences in extraversion have traditionally been linked to high *experienced* arousal, this research points to a correspondingly underactive brain during rest (but see Posner, Russell, & Peterson, 2005, for the relation between experienced and physiological arousal).

One particularly fruitful approach to understanding the arousal dimension of affect and attitudes is Reinforcement Sensitivity Theory (Gray, 1970, 1972, 1982, 1991; Gray & McNaughton, 2000). According to the theory (Gray, 1991; Gray & McNaughton, 2000), different regulatory systems underlie responses to reward and punishment: (1) the behavioral approach system (BAS), (2) the behavioral inhibition system (BIS), and (3) the fight-flight-freezing system. First, the BAS is engaged by positively valenced stimuli, rewards, or relief from punishment, and regulates approach behaviors (Gray, 1991; Gray & McNaughton, 2000). Associated characteristics involve impulsivity, risk taking, and predisposition for mania (Gray, 2000). Second, the BIS is engaged by conflicting goals leading to the need to inhibit one of these goals (Gray, 1991; Gray & McNaughton, 2000). This system is presumably sensitive to punishment, nonreward, and novelty, and is involved in reducing negative or painful outcomes by inhibiting movement toward goals (Gray, 1991; Gray & McNaughton, 2000). Associated psychopathology includes high anxiety, generalized anxiety disorder,

and obsessive-compulsive disorder (Gray & McNaughton, 2000). Third, the fight-flight-freeze system regulates escape/avoidance behavior and is engaged by aversive stimuli. Associated characteristics and disorders include fear, avoidant personality disorder, phobias, and panic attacks (Gray & McNaughton, 2000).

Even though BAS and BIS closely align with approach to positive stimuli and avoidance of negative stimuli, scholars have debated whether the BAS system is related to only positive emotions and approach behavior, or instead to both positive and negative emotions, as well as active approach and avoidance. Empirical evidence supports both of these claims. On the one hand, self-reported BAS is associated with greater left frontal cortical activity, approach behavior, and positive affect, whereas self-reported BIS is associated with greater right frontal cortical activity and negative affect (Sutton & Davidson, 1997). On the other hand, arousal seems to be associated with asymmetric frontal activity that responds to both elation and anger (Harmon-Jones & Allen, 1998; Hewig, Hagemann, Seifert, Naumann, & Bartussek, 2006). This finding suggests that approach can also involve negative emotions.

More generally, impulsivity and particularly the hyperactive/impulsive form of attention-deficit/hyperactivity disorder (ADHD) are linked to generalized low arousal, as judged by slower blood flow in the brain (Fischer et al., 1997; Mathew et al., 1984) and reduced activity in frontal and striatal regions that are responsible for impulse control (Amen & Carmichael, 1997; Lou, Henriksen, & Bruhn, 1984; Lou, Henriksen, Bruhn, Borner, & Nielsen, 1989; Rubia et al., 1999). At the same time, this low baseline arousal (which is not always found, see e.g., Zuckerman, 1990) may render a predisposition to experience arousal in the presence of external and, in particular, interesting stimuli. High-sensation seekers, for example, manifest greater increases in both heart rate and amplitude of event-related potentials than low-sensation seekers in the presence of interesting stimuli (e.g.,  $r = .67$ ; Pierson, Le Houezec, Fossaert, Dubal, & Jouvent, 1999; Smith, Perlstein, Davidson, & Michael, 1986; Smith, Davidson, Smith, Goldstein, & Perlstein, 1989; Zuckerman, Simons, & Como, 1988; but see de la Pena, 1992, for a review of inconsistent findings). In this light, highly impulsive individuals may be highly aroused by certain stimuli, and hence their attitudes may be more extreme, more confident, or perceived as more important. Up to now, however, researchers have neither theorized about nor researched the attitude strength implications of individual differences in traits associated with stable valence and arousal patterns. This mission seems imperative for the upcoming generation of attitude research.

## Genetics and Neurotransmitters

Although pinpointing one gene that explains a particular behavioral pattern currently seems like an impossible endeavor, research has identified some important genetic markers for the traits of neuroticism and impulsivity (for a summary, see Table 11.1). To begin, quantitative genetic studies have shown that about 40% of the variance in neuroticism has a genetic basis (Jang, Livesly, & Vernon, 1996; Loehlin, 1992). Identifying specific genes for neuroticism, however, has been challenging, and efforts have concentrated on genes related to the transport and reception of serotonin. The results from these attempts have not always been consistent and together suggest small associations. For example, two studies compared individuals with extremely high and low levels of neuroticism. Although one of these studies revealed five loci that differed across individuals with high and low levels of neuroticism (Fullerton et al., 2003), the other found no significant differences in these loci (Nash et al., 2004). A more recent study with eight DNA pools from participants with extreme neuroticism scores provided a whole-genome analysis of associations with neuroticism (Shifman et al., 2008). This second study found no single locus that accounted for more than 1% of the variance in neuroticism but did identify a polymorphism of the *PDE4D* gene (rs702543) associated with neuroticism (1% of the variance). Although this gene has been consistently implicated in major depression (Scott, Perini, Shering, & Whalley, 1991; Zhang et al., 2002), its low explanatory power in this study suggests that multiple loci likely support differences in neuroticism.

As abnormalities in the central serotonergic system play a critical role in the cause of major depression and anxiety disorders (Coccaro & Murphy, 1990; Maes & Metzger, 1995), it is not surprising that neuroticism has been linked to the serotonin transporter gene (*5-HTTLPR*). The serotonin transporter influences serotonergic

Table 11.1 Summary of Trait Heritability and Associated Genes

	Neuroticism	Impulsivity
% of trait explained by heritability	40%	40–60%
Genes that have been identified as related	<i>PDE4D</i> (phosphodiesterase 4 D gene) <i>5-HTTLPR</i> (serotonin transporter gene)	<i>D4</i> (dopamine transporter gene) <i>DRD2</i> and <i>DRD4</i> (dopamine receptor genes) <i>DAT1</i> (dopamine transporter gene) <i>CNTRF</i> (ciliary neurotrophic factor gene)

neurotransmission by affecting reuptake of synaptic serotonin, which varies among individuals and is abnormal in individuals who suffer from anxiety and depression (Metzer & Arora, 1988; Owens & Nemeroff, 1994). Although this gene and dysregulation of the serotonergic system would seem to be excellent candidates for explaining neuroticism, studies have failed to provide consistent supportive evidence. Lesch et al. (1996) reported that differences in the 5-HTTLPR accounted for 3% to 4% of the variability in neuroticism in two predominantly male samples with extreme neuroticism scores. However, five subsequent studies (Ball et al., 1997; Ebstein et al., 1997; Flory et al., 1999; Jorm et al., 1998; Nakamura et al., 1997) have failed to replicate this finding, casting a shadow of doubt on whether the serotonin transporter gene is involved at all. All in all, the *PDE4D* and *5-HTTLPR* genes are likely to play some role in negative affectivity and should be examined in relation to negative attitudes as well.

Like neuroticism, an estimated 40% to 60% of the variance of impulsivity is inherited (Bouchard, 1994; Fulker, Eysenck, & Zuckerman, 1980; Loehlin, 1992; Rietveld, Hudziak, Bartels, van Beijsterveldt, & Boomsma, 2004), although the genetic influence is attenuated by such factors as religious upbringing (Boomsma, de Geus, van Baal, & Koopmans, 1999). Furthermore, many specific attitudes related to impulsivity have considerable heritability. For example, high heritability has been observed in attitudes toward alcohol (51%; Perry, 1973), extreme and dogmatic attitudes (more than 50%; Martin et al., 1986), as well as attitudes toward roller coasters, practicing sports, the death penalty for murder, abortion on demand, and reading books (Olson, Vernon, Harris, & Jang, 2001). Moreover, attitudes with high heritability indexes are also highly accessible, highly resistant to change, and more frequently sought out in selecting attractive others (Olson et al.; Tesser, 1993). These attitude properties seem to align well with the arousal dimension of affect and attitudes, indicating that not only valence but also strength/arousal are likely to be biologically based.

To date, the genetic basis of impulsivity has been at least partially established. Alleles of the dopamine receptor D4 (*DRD4*) gene are associated with the trait of novelty seeking, which correlates with impulsive sensation seeking (e.g.,  $r = .15$ ; Bailey, Breidenthal, Jorgensen, McCracken, & Fairbanks, 2007; Ebstein et al., 1996). The long allele correlates with high levels of sensation seeking and the short allele with low-to-moderate levels of this trait (Ebstein et al., 1996). However, this finding has been replicated in about half of the studies that have tested this association (Prolo & Licinio, 2002) and is yet to be connected with attitudes. Both the trait of novelty seeking and the gene itself could correlate with positive attitudes

toward novel and existing stimuli, but a study of these associations will probably benefit from large samples and a multigene approach.

Other genes also contribute to explaining impulsivity, even though their explanatory power is much lower than the 40% to 60% estimated heritability of the trait. Comings, Saucier, and MacMurray (2002), for example, found that four dopamine receptor genes contributed around 5% of the variance in novelty seeking. Along the same lines, *DRD2* and *DRD4* have been associated with novelty seeking (Noble et al., 1998), as well as drug and alcohol abuse disorders, ADHD, and pathological gambling (Comings, Saucier, & MacMurray, 2002; Ebstein & Kotler, 2002). The *DRD4* gene interacts with parenting quality to influence the presence of ADHD in children (Sheese, Voelker, Rothbart, & Posner, 2007). The dopamine transporter gene, *DAT1*, has also been implicated in the cause of ADHD, which frequently involves high impulsivity. Studies of affected children and their parents have identified a significant correlation between a 10-repeat allele of the *DAT1* gene and ADHD (Cook et al., 1995; Daly, Jawj, Fitzgerald, & Gill, 1999; Gill, Daly, Heron, Hawi, & Fitzgerald, 1997; Waldman et al., 1998). Moreover, in some studies (Waldman et al.) but not in others (Farrow, Levy, & Silberstein, 2005), this association was stronger for the hyperactive impulsive form of ADHD than for the solely inattentive form. In summary, associations of the dopamine receptor and transporter genes with impulsivity support the hypothesis of abnormal (accelerated) dopamine transport and reuptake in impulsivity (Barkley, 1998; Farrow et al., 2005; Swanson & Castellanos, 2002). The increased reuptake presumably decreases the time for dopamine to act on the synapse and may explain the general finding of underactive brains in ADHD and perhaps impulsivity more generally (Farrow et al., 2005). Overall, fast dopamine reuptake may generate a preference for attitude objects that increase dopamine production, including drugs, roller coasters, and risky sexual situations.

Genes related to the general efficiency and health of neurons may also play a role in impulsivity. A large study of patients with ADHD tested the premise of deficient neurotrophic factors in this condition (Ribasés et al., 2008). These factors constitute a family (i.e., the nerve growth factor and the ciliary neurotrophic factor) that controls the growth and proper development of nerves. Within this family, one gene (*CNTRF*) is reportedly associated with both adult and childhood ADHD, and two genes (*NTF3* and *NTRK2*) are reportedly associated with childhood ADHD (Ribasés et al.). The effect sizes for these associations ranged from an odds ratio (OR) of 1.38 to 1.52, with additive effects yielding an OR of 2.04 (Ribasés et al., 2008), and may in the future be examined for specific attitudes in addition to self-reported personality traits.

## Summary

The personality traits of neuroticism and impulsivity/extraversion influence the valence and arousal levels of chronic affective reactions. Both neuroticism and impulsivity have been associated with attitudes about specific objects, such as mostly negative attitudes for neuroticism and attitudes that are more reactive to external information for impulsivity. Small correlations exist between neuroticism and the serotonin transporter gene, as well as between impulsivity and the dopamine receptor and transporter genes. Despite their small size, these associations represent a critical first step in understanding how genes might influence attitude valence and arousal by exerting an influence on stable affective responses such as those encompassed by neuroticism and impulsivity.

## INADVERTED ENVIRONMENTAL INFLUENCES: ATTITUDES IN RESPONSE TO A SEEMINGLY PASSIVE ENVIRONMENT

Despite biological and genetic contributions, attitudes are undeniable results of the environment even when we fail to advert, or attend to, its influence. In 1957, in Ft. Lee, New Jersey, moviegoers watching William Holden and Kim Novak star in *Picnic* were ostensibly shown messages such as, "Eat popcorn," and "Drink Coca-Cola," during the screening of the film (see McConnell, Cutler, & McNeil, 1958). The presentation of these messages was said to have been just 1/3,000th of a second, well below the threshold of conscious visual perception (i.e., the limen). Although the brief presentation made it impossible for the innocent moviegoers to have noticed the messages, James M. Vicary and Frances Thayer, architects of this early effort at subliminal persuasion, claimed that the presentation of these messages increased popcorn sales 58% and cola sales 18% over the course of 6 weeks.

These early subliminal persuasion effects were, however, pure fiction. Attempts to replicate Vicary's claims under controlled conditions were unsuccessful. In an interview published in June 1962 in *Advertising Age*, Vicary admitted to making up the story to drum up publicity for his marketing firm (Danzig, 1962). Despite the fraud in Vicary's claims of subliminal persuasion, it is clear that attitudes can be formed and changed outside of conscious awareness (Clore & Schnall, 2005; Kruglanski & Stroebe, 2005; but see Cacioppo, Marshall-Goodell, Tassinari, & Petty, 1992). A lack of awareness may be present at different stages of the persuasion process. People may be unaware of the presence of a persuasive stimulus, they may be unaware of cognitive processes that mediate attitude formation and change, and they may be unaware

that their attitudes have actually changed (see Chartrand, 2005). Unfortunately, extant research is not so easily classified. In some cases, people may be unaware of more than one stage: People presented with subliminal stimuli are obviously unaware of the presence of a stimulus and are presumably unaware of cognitive processes engaged by the unseen stimulus, but it is unclear whether they lack awareness of attitudinal change. This section reviews theory and research addressing issues of attitude change when people interact with a seemingly passive environment, when there is no obvious intent to persuade. "No obvious intent to persuade" may be reflected in a variety of different ways, from subliminal persuasion to mere exposure to evaluative conditioning (EC) to direct experience with an object. We begin with the most obvious instance of a seemingly passive environment, where people are unaware of the existence of a stimulus.

### Subliminal Persuasion and Priming

Subliminal persuasion sounds like a sexy topic to the layperson, but for psychologists, even assessing whether a stimulus is subliminal engenders controversy. Colloquially, subliminal has been used to refer to unnoticed, disguised, masked, and genuinely imperceptible stimuli (Pratkanis & Greenwald, 1988). The term "subliminal" evokes the limen, defined as the point at which a stimulus evokes a sensation. Unfortunately, the concept of a point, or absolute threshold for the presence of some phenomenological sensation, is dubious. Thresholds tend to be normally distributed, and they vary both interpersonally and intrapersonally (Stevens, 1951). Various approaches to operationalizing subliminal presentations have been suggested (e.g., signal detection theory; Synodinos, 1988), but the contemporary consensus has settled on simple self-report. A stimulus is considered subliminal when participants claim to be unable to perceive it, especially in the presence of incentives for correct reports (Cheesman & Merikle, 1986; Fowler, Wolford, Slade, & Tassinari, 1981; Greenwald, 1992; Kihlstrom, 1987, 1999; Merikle, 1988).

Until recently, evidence for subliminal persuasion had been weak at best. Null effects (Champion & Turner, 1959; de Fleur & Petranoff, 1959; George & Jennings, 1975; Greenwald, Spangenberg, Pratkanis, & Eskenazi, 1991; Merikle, 1988; Pratkanis, Eskenazi, & Greenwald, 1994; Smith & Rogers, 1994; Vokey & Read, 1985), failures to replicate (e.g., Hawkins, 1970, a significant effect; Beatty & Hawkins, 1989, no effect), and methodological problems (for reviews see Moore, 1982, 1988; Pratkanis & Aronson, 1992) are legion. A meta-analysis of 23 studies obtained a nontrivial effect of subliminal advertising ( $r = .06$ ; Trappey, 1996), but this analysis must be treated with caution because it



included work with critical methodological problems (e.g., treating disguised and unnoticed objects as “subliminal”).

A trio of recent articles has demonstrated some effect of subliminally presented stimuli on attitudes and behavior. In one study, participants watched an 18-minute segment of an adult cartoon (*The Simpsons*). Experimental participants were subliminally exposed to the word “thirsty” and a picture of a can of Coca-Cola 12 times each for 33 ms at each presentation. Control participants were exposed to blank, white screens at the same exposure rate and intervals as experimental participants. Before the manipulation, experimental and control participants reported being equally thirsty; after the manipulation, experimental participants reported being significantly more thirsty than control participants. In a follow-up study, the researchers eliminated the possibility of “thirsty” operating as a semantic prime by using images of a sweaty athlete and a can of Coca-Cola. Similar results obtained (Cooper & Cooper, 2002).

Other researchers experimentally manipulated thirst by having all participants eat cookies and then having half of the participants drink a glass of water (Strahan, Spencer, & Zanna, 2002). Next, participants were subliminally (16 ms exposures) presented with either thirst-related, or unrelated, words via computer-mediated lexical decision task. There was an effect of the thirst manipulation on self-reported thirst, but contrary to Cooper and Cooper (2002), no effect of subliminal priming on self-reported thirst. However, in an ersatz taste test after the priming manipulation, thirsty participants who had also been primed with thirst drank the most Kool-Aid. In a follow-up study, thirsty participants were subliminally primed with either thirsty or neutral words, and then shown advertisements for thirst-quenching and electrolyte-replacing beverages. Thirst-primed participants liked, and took more coupons for, the thirst-quenching beverage compared with participants primed with neutral words. Conceptually similar results obtained when participants who were primed with a sad face, and expected to interact with others, preferred a mood-restoring music CD. In all cases, subliminal priming led to greater persuasion when participants were motivated to engage in a related behavior.

Other work showed that subliminal priming of brands could influence preferences for branded items. Karremans, Stroebe, and Claus (2006) also manipulated participant thirst and subliminally primed either a particular brand of beverage or a neutral word. Again, thirsty participants were most influenced by the priming manipulation. Thirsty participants who received the neutral prime showed virtually no preference for one beverage over another, but thirsty participants who received the brand prime preferred the primed brand. Thus, subliminal persuasion seems to be most effective when a related motive is already aroused.

In other research, the subliminal presentation of a significant other’s name has been shown to have variable effects on achievement behavior depending on whether the other is close and values achievement (Fitzsimons & Bargh, 2003). Specifically, when the word “dad” (vs. a control prime) was subliminally presented, individuals who felt close to their dad and also believed their dad to value achievement exhibited greater persistence and quicker identification of achievement-related words in a lexical decision task. In contrast, individuals who felt close to their father but felt no paternal pressure to achieve performed worse at these tasks (Shah, 2003).

The behavioral effects of a subliminal prime seem to be contingent on a preexisting motivation to engage in this behavior. In one study, the masked, 33-ms presentation of achievement primes increased willingness to resume an achievement task only in participants with high self-reported achievement motivation. The prime, however, had reversed effects in participants with low self-reported achievement motivation, who appeared to inhibit achievement goals and performed worse in the presence than in the absence of a prime (Hart & Albarracín, 2009). Thus, these results provide evidence that personal dispositions interact with subliminal environmental stimuli to produce changes in participants’ responses.

There is also evidence of more indirect subliminal persuasion by which subliminal exposure to a source can increase persuasion to a message later delivered by that source. In two studies, participants were either not exposed, subliminally exposed, or supraliminally exposed to a face that later turned out to be the source of a persuasive message (Weisbuch, Mackie, & Garcia-Marques, 2003). Participants who were subliminally exposed to the source were more persuaded by the arguments, and this effect was not mediated by explicit liking of the source. Moreover, participants who were supraliminally exposed to the source were also more persuaded by the arguments, but this effect was mediated by explicit liking of the source and disappeared when participants were informed that they had previously been exposed to the source. Thus, Weisbuch et al. (2003) speculated that participants misattributed the positive responses coming from the familiar source to the persuasive message.

Subtle influences on attitudes and behaviors are sometimes general rather than specific to an object. For example, general action and inaction primes (e.g., “go” vs. “rest”) influence the amount of motor or cognitive output irrespective of the type of behavior in question, with the same stimuli producing trivial and important motor and cognitive manifestations normally viewed as parts of different systems (Albarracín, Handley, Noguchi, McCulloch, Li, Leeper et al., 2008; Hart & Albarracín, in press). A series of experiments by Albarracín and colleagues (Albarracín,

Handly et al., 2008; Albarracín, Wang et al., 2009) examined the effects of instilling general action and inaction goals using word primes such as "action" and "rest." Some of the experiments showed that the same stimuli, presented either subliminally or supraliminally, influenced motor output, such as doodling on a piece of paper and eating, as well as cognitive output, such as recall and problem solving. Two experiments supported the prediction that these diverse effects can result from the instigation of general action and inaction goals. Specifically, these last two studies confirmed that participants were motivated to achieve active or inactive states and that attaining them decreased the effects of the primes on behavior. Although these effects entailed a cognitive representation of action and inaction, they are clearly relevant to the arousal dimension of attitudes and may, under certain conditions, contribute to making stimuli more arousing.

In conclusion, despite accumulating evidence that subliminally presented stimuli can influence behavior (e.g., Bargh, Chen, & Burrows, 1996), there remains no good evidence for subliminal persuasion operating as powerfully as Vicary imagined it. Subliminally presented stimuli are at best a weak persuasive force. They seem to have their greatest influence when people are already predisposed toward a related course of action (e.g., when a related motive is aroused), and when the opportunities for that action are readily apparent and easily performed. Subliminally primed individuals who face physical impediments or psychological distractions to the related actions are (presumably) unlikely to show evidence of subliminal primes, and simply priming a command (eat popcorn) does not seem likely to cause a movie patron to get up, leave the ongoing film, and buy a box of popcorn. Moreover, most of the current evidence on subliminal priming occurs in simple contexts, when primes are presented alone on an otherwise blank screen. Whether primes can be effectively embedded in a context where they compete for attention with other words and images remains largely an empirical question.

### Mere Exposure

Attitudes toward a stimulus may become more favorable with increasing frequency of exposure to the stimulus (Zajonc, 1968).<sup>2</sup> In a classic example of the mere exposure

paradigm, and an unambiguous case of no obvious intent to persuade, Kunst-Wilson and Zajonc (1980) subliminally presented 10 different polygons, 5 times each, to participants. The researchers informed participants that "slides would be shown on the screen at durations so brief that one could not really see what was being presented . . ." (p. 557). After the presentation of stimuli, participants were shown pairs of polygons, one old and one new, and asked to indicate which one they had been shown earlier and which one they preferred. Recognition of the polygons was just below chance (48%), but preference for old polygons was substantially higher than chance (60%).

Fifty years of mere exposure research has yielded an enormous amount of information, so here we describe just a few important conclusions and the current state of the area. In summarizing 208 empirical studies from 134 articles published between 1968 and 1987, Bornstein (1989) obtained a moderate effect size of .26. The effect emerges for all types of stimuli: auditory ( $r = .24$ ), ideographs ( $r = .22$ ), nonsense words/syllables ( $r = .24$ ), photographs ( $r = .37$ ), meaningful words/names ( $r = .49$ ), polygons ( $r = .41$ ), and real people/objects ( $r = .20$ ), except for abstract paintings, drawings, and matrices ( $r = -.03$ ). Moreover, the effect tends to be stronger when a heterogeneous ( $r = .30$ ) versus homogeneous ( $r = -.02$ ) pool of stimuli are presented, when exposure times are shorter (especially less than 1 second,  $r = .41$ ), when stimuli are more complex (no effect size reported, but six of nine studies found more favorable attitudes for complex stimuli compared with simple stimuli), when the maximum number of stimulus presentations is up to nine ( $r = .21$ ), when there is some delay between stimulus exposure and evaluation ( $r = .22$ ), and when the participants are adults ( $r = .30$ ) instead of children (aged 12 or younger,  $r = .05$ ).

Explanations of the processes underlying the mere exposure effect have varied, with initial debate focusing on the extent to which higher-order cognition is involved. Demand effects (Stang, 1974), belief formation (Grush, 1976), and a combination of positive habituation and boredom (Berlyne, 1970) were all proposed as explanations underlying mere exposure effects. However, after the subliminal demonstration (Kunst-Wilson & Zajonc, 1980), in which participants could not possibly have intentionally thought about stimuli they had not even seen, deliberative cognition about the stimuli was reduced to a sufficient but not necessary cause. Bornstein (1989) suggested that adding notions of implicit cognition to the habituation and boredom model would help account for nearly all of the major conclusions (noted earlier) in his meta-analysis. But a more parsimonious contender came to light. Perceptual fluency—the notion that previously encountered stimuli are easier to perceive and process (Jacoby, Kelley, Brown, &

<sup>2</sup>Notably, attitude change caused by mere exposure is different from attitude change caused by message repetition. In the mere exposure paradigm, participants are repeatedly presented with an attitude object and there is no obvious intent to persuade. In the message-repetition paradigm, participants are repeatedly provided with information about the attitude object, and thus the intent to persuade is clear (Eagly & Chaiken, 1993).

Jasechko, 1989), and that this ease is misattributed as liking (Bornstein & D'Agostino, 1994; Smith, 1998)—emerged as a likely candidate for explaining mere exposure effects.

More recent work, however, has cast some doubt on the perceptual fluency/misattribution account, at least insofar as it requires intentional cognitive processing. If liking is due to misattributed perceptual fluency, individuals should make negative adjustments to their liking ratings when they believe they have previously seen the stimuli (Bornstein & D'Agostino, 1994). However, evidence is accumulating that the opposite holds true, that people prefer stimuli that they recognize (Anand & Sternthal, 1991; Brooks & Watkins, 1989; Fang, Singh, & Ahluwalia, 2007; Newell & Shanks, 2007; Szpunar, Schellenberg, & Pliner, 2004; Whittlesea & Price, 2001; but see Weisbuch et al., 2003). Furthermore, repeated exposure to stimuli also increases liking of novel stimuli and has positive effects on mood (Monahan, Murphy, & Zajonc, 2000), neither of which can be explained by the perceptual fluency/misattribution hypothesis but can be explained by a more generalized, automatic effect of fluency.

The role of fluency in evaluative judgments has also been proposed to be potentially independent of intentional information processing (Winkielman & Cacioppo, 2001; Winkielman, Schwarz, Fazendeiro, & Reber, 2003). Winkielman and his colleagues have argued that perceptual or conceptual fluency, or both, may or may not be consciously recognized. According to the hedonic fluency model, any mental process that is fast and effortless engenders a positive affective response. Fluent processing, therefore, engenders positive affect, which is physiologically detectable (Harmon-Jones & Allen, 2001; Winkielman & Cacioppo, 2001) and may be transferred to evaluative judgments of previously seen stimuli, as well as novel stimuli and self-reported mood (Monahan et al., 2000). A meta-analysis of 90 studies examining the effect of perceptual fluency on affective judgments obtained a medium effect size (Cohen's  $d = .50$ ). The effect was moderated by participants' awareness of the experimental manipulation, such that aware participants tended to discount fluency and use other inputs to form attitudes, and the valence of the stimuli, such that neutral and positive stimuli produced larger fluency effects than negative stimuli (Warth, 2008).

After 50 years of research on the mere exposure effect, the final word on explaining the effect may be near. The hedonic fluency model allows for both conscious and non-conscious effects of perceptual fluency on evaluative judgments. Repetition facilitates ease of processing, which, in turn, signals a positive state of affairs and induces generalized positive affect. This positivity may then influence evaluations of previously presented and novel stimuli, as well as a person's mood. Recently, however, Zajonc (2001)

proposed that the mere exposure effect may be caused by a simple conditioning effect.

### Evaluative Conditioning

Just as Pavlov's dog came to salivate at the ring of a bell, so can attitudes be formed via the repeated pairing of stimuli. Pavlovian conditioning occurs when a conditioned stimulus (CS; such as a bell) is consistently presented before an unconditioned stimulus (US; such as food), and the CS eventually provokes a response that was initially provoked only by the US (such as salivation). EC may be procedurally similar to Pavlovian (classical) conditioning (Martin & Levey, 1978, 1994; Levey & Martin, 1975), in which the US is an evaluatively valenced object and the CS is an evaluatively neutral object. EC is said to occur when the CS takes on the valence of the US. As noted later, however, EC also differs from classical conditioning in several important ways (de Houwer, Thomas, & Baeyens, 2001).

In an attempt to explain the mere exposure effect, Zajonc (2001) proposed that the repeated stimuli are the conditioned stimuli and the *lack* of aversive experience throughout the experimental paradigm serves as a US. According to this account, novel stimuli elicit both approach and avoidance responses. When no aversive experience is paired with the CS, "avoidance and escape drop out, leaving only approach responses" (p. 226). However, Pickering and Gray (1999) noted that novel stimuli and stimuli indicating punishment or frustration activate the BIS (i.e., anxiety), whereas reward and stimuli indicating relief from punishment activate the BAS. Thus, Monahan et al.'s (2000) single exposure condition should have evoked anxiety and correspondingly more negative explicit ratings of mood and novel stimuli. Contrary to this possibility, however, participants in the single-exposure condition did not rate the stimuli any more negatively than those in the control (no exposure) condition. The conditioning explanation for mere exposure effects requires further testing.

EC effects are not large (de Houwer, Baeyens, & Field, 2005) but seem to generalize across all five senses: visual (Levey & Martin, 1975), auditory (Eifert, Craill, Carey, & O'Connor, 1988), haptic (Hammerl & Fulcher, 2005), gustatory (Zellner, Rozin, Aron, & Kulish, 1983), and olfactory (Todrank, 1993). EC has also been demonstrated across sensory modality, such as visual-auditory (Blair & Shimp, 1992), visual-olfactory (Hermans, Baeyens, & Natens, 2000, cited in De Houwer et al., 2005), and visual-gustatory (Johnsrude, Owen, Zhao, & White, 1999). EC takes place regardless of the order in which the CS and US are paired: when the CS is presented before the US (Levey & Martin, 1975), when the CS and US are presented simultaneously

(van Reekum, van den Berg, & Frijda, 1999), and when the US is presented before the CS (Stewart, Shimp, & Engle, 1987). Moreover, EC has been verified through observational learning (Baeyens, Eelen, Crombez, & De Houwer, 2001), using both subliminal and supraliminal stimulus presentation (e.g., Dijksterhuis, 2004), with both explicit and implicit attitude measures (Olson & Fazio, 2001, 2002), and both with and without contingency awareness (Olson & Fazio, 2001, 2002; Pleyers, Corneille, Luminet, & Yzerbyt, 2007).

One of the ways in which EC differs from classical conditioning is the hypothesized necessity of contingency awareness. Classical conditioning effects are predicated on human learning and contingency awareness. If one does not recognize that an electric shock always follows the ringing bell, one should not develop a cringe response to the ringing bell. Current evidence suggests that EC occurs with awareness (e.g., Purkis & Lipp, 2001) and without awareness (Davey, 1994; Hammerl & Fulcher, 2005; Field & Moore, 2005). Nierman (2008) meta-analyzed 50 EC studies and found mean-weighted effect sizes of  $d = .65$  for contingency-aware respondents and  $d = .27$  for contingency-unaware respondents. As contingency awareness affects EC but does not completely eliminate it, EC may really belong at the intersection of active and passive persuasion processes. A second way in which EC differs from classical conditioning is that classical conditioning disappears when the CS is no longer paired with the US (Hamm & Vailt, 1996). In contrast, EC effects appear to resist extinction, even after 5 and 10 presentations of the CS without the US (Baeyens, Crombez, van den Bergh, & Eelen, 1998; Diaz, Ruiz, & Baeyens, 2005; but see Lipp & Purkis, 2006).

As with mere exposure effects, the mechanisms underlying EC effects are not yet entirely understood. Several models have been put forth. One theory involves a holistic, or Gestalt, principle in which the CS takes on the valence of the US simply by virtue of their spatiotemporal contiguity (Martin & Levey, 1978, 1994; Walther, Nagengast, & Trasselli, 2005). Others have proposed two different systems at work for classical conditioning and EC (Baeyens & de Houwer, 1995; Baeyens, Eelen, & Crombez, 1995). According to this line of thought, classical conditioning is driven by an expectancy or signal learning system that initiates preparatory responses (e.g., the cringe), whereas EC is driven by a less sophisticated referential system that responds to paired events. The referential system is hypothesized to automatically average the valence of the paired events.

Others have proposed that multiple cognitive processes, both implicit (automatic, associative) and explicit (propositions about stimulus contingencies), may be simultaneously involved in EC effects (de Houwer et al., 2005; de Houwer, 2007). The multiple processes perspective has

also been used to propose an explanation for conflicting results regarding contingency awareness and extinction (de Houwer, 2007). EC effects driven by associative processing might arise outside of contingency awareness, but those driven by propositional processes would almost certainly be subject to contingency awareness. Similarly, EC effects driven by propositional processes might be more susceptible to extinction because participants are actively monitoring stimulus presentation and forming rules about stimulus pairings. To date, however, these ideas are speculative, so the topic remains an active and rich area of study.

### Implicit Attitudes

Implicit attitudes have been conceptualized as automatic, highly stable and resistant to change, developed over the long term, and largely because of socialization (e.g., Wilson, Lindsey, & Schooler, 2000). Consistent with such a conceptualization, some research has found changes in explicit (more deliberate, conscious attitudes) but not implicit attitudes (e.g., Gawronski & Strack, 2004). However, there is also evidence that implicit attitudes can be changed without a corresponding change in explicit attitudes (e.g., Dasgupta & Greenwald, 2001; Karpinski & Hilton, 2001; Olson & Fazio, 2006), and evidence that explicit attitudes change more slowly than implicit attitudes in the face of counterattitudinal information (Rudman, Phelan, & Heppen, 2007; Rydell & McConnell, 2006; Rydell, McConnell, Strain, Claypool, & Hugenberg, 2007). A meta-analysis of 126 studies examining correlations between the Implicit Association Test and explicit attitude measures obtained an average  $r$  of .24 (Hoffmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). These dissociations hence suggest that implicit and explicit attitudes are, indeed different, but the chapter on implicit attitudes (Banaji & Heiphetz, this volume) can provide readers with much more information.

Differences between implicit and explicit attitudes have also been observed in studies using neuroimaging. At least three structures appear to participate in automatic evaluations, namely the amygdala, the insula, and the orbitofrontal cortex (Bechara et al., 1999; Cunningham et al., 2004; Hamann et al., 2002; Irwin et al., 1996; Kringelbach & Rolls, 2004; Lane, Fink, Chau, & Dolan, 1997; Morris et al., 1996; Petrides, 2007; Phan et al., 2004; Reekum et al., 2007; Rempel-Clower, 2007; Royet et al., 2003; Sergerie, Lepage, & Armony, 2006; Taylor, Phan, Decker, & Liberzon, 2003; Wright et al., 2008). Correspondingly, the ACC is believed to be involved in controlled evaluations (Critchley, 2005; Cunningham et al., 2003, 2004; Taylor et al., 2003). Activations of the ACC, involving both the ventral ACC (BA 24) and the dorsal ACC (BA 32), have been observed in functional neuroimaging studies that span a wide range of

cognitive contexts including selective attention and memory, and evaluation of stimuli (Cabeza & Nyberg, 1997; Egan et al., 2003; Hariri, Mattay, Tessitore, Fera, & Weinberger, 2003; Lane, Chua, & Dolan, 1999; Papez, 1937). There is also specific evidence of anterior cingulate activity while evaluative (vs. nonevaluative) judgments of visual stimuli are requested (as well as activity in the temporal pole and the frontal operculum; Lane et al., 1997). Furthermore, a recent study that carefully separated explicit evaluative judgments from implicit responses to positive and negative stimuli revealed that the amygdala was involved in spontaneous responses, whereas the orbitofrontal cortex was involved in explicit evaluative judgments (Wright et al., 2008).

These brain functional processes have also been investigated using training to produce automation in real time. Participants who practiced evaluating visual stimuli became faster with time and were also more likely to make evaluative judgments spontaneously after the practice (Hong, Albarracín, Wright, & Liu, 2008). Moreover, in a study using functional magnetic resonance imaging, practicing evaluation had effects on brain activation in various regions. Specifically, there were posttraining increases in the activation of brain regions associated with automatic evaluative processing (e.g., the amygdala, the insula, and the orbitofrontal cortex), regions associated with controlled evaluative processing (e.g., the temporal pole, the ACC, and the frontal operculum), and late visual regions (e.g., the posterior fusiform, the superior occipital lobe, and the parietal occipital lobe). Moreover, evaluation proceduralization was reflected by increased activity in areas associated with procedural learning (e.g., the striatal regions, the lateral cerebellum, the precuneus, and the inferior frontal cortices) and decreased activity in areas associated with declarative learning (e.g., the medial temporal lobe, the ventromedial prefrontal cortex, and the dorsolateral prefrontal cortex). Of all these regions, however, only evaluative regions correlated with the increase in evaluative speed that followed training.

In terms of purely psychological models, implicit and explicit attitudes are thought to reflect the operation of associative and propositional processes, respectively (Gawronski & Bodenhausen, 2006). Implicit attitudes, typically measured using response-time tasks assessing the ease with which people can associate attitude objects with positive or negative stimuli (but see Vargas, Sekaquaptewa, & von Hippel, 2007), are hypothesized to reflect automatically retrieved affective responses that are linked to attitude objects. These responses are not assumed to reflect personal endorsement, but only evaluative thoughts that are linked with the object under consideration. Thoughts linked to an object may also be dependent on the context; for example, "lamb" may be associatively linked to "wool" on a cold day but to "dinner"

in a restaurant. Explicit attitudes, typically measured by self-report, are hypothesized to reflect the operation of a superordinate reflective system that transforms associative evaluative responses into propositions (e.g., "I like lamb") subject to syllogistic reasoning to appraise their legitimacy (see Albarracín, Hart, & McCulloch, 2006; Albarracín, Noguchi, & Earl, 2006; Hart & Albarracín, 2009; Senay, Albarracín, & Noguchi, in press). In many cases, initial, automatic evaluative responses will be deemed valid and serve as the basis for explicit attitudes (i.e., implicit and explicit attitudes will be correlated); however, the engagement of reflective processing of propositional statements may produce implicit-explicit dissociations when the initial explicit evaluative response is deemed invalid.

Implicit attitude change, according to Gawronski and Bodenhausen's (2006) associative-propositional-evaluation (APE) model, can occur when the evaluative associations for a given object change (as in EC research, reviewed earlier), and when contextual cues cause a different pattern of evaluative associations to come to mind. For example, implicit prejudice against African Americans may decrease by exposing White participants to either admired African Americans and disliked Whites (vs. disliked African Americans and admired Whites; Dasgupta & Greenwald, 2001). Explicit attitude change, according to the model, can occur when the evaluative associations for a given object change (see prior review of EC research), when the propositions considered to be relevant change (e.g., when new information about an object is learned; Petty & Wegener, 1998), when people reassess their extant cognitions about an object (Wilson, Dunn, Kraft, & Lisle, 1989), and when efforts to achieve cognitive consistency change (e.g., when one of two dissonant propositions is rejected, or when an additional proposition helps resolve the dissonance; Gawronski & Strack, 2004). Finally, this APE model allows for influence attempts to interact with associative and propositional processing in a variety of different ways that are beyond the scope of this chapter.

The APE model is not the only model proposed to explain the formation of implicit and explicit attitudes. According to Bassili and Brown's (2005) potentiated recruitment framework, implicit and explicit attitudes both emerge from interconnected microconcepts ("molecular elements of knowledge that yield meaning when assembled into networks with other microconcepts" [p. 552]). Which microconcepts are activated, and hence which attitude is evoked, depends on four sources of potentiation: recent experience/information, context, spreading activation among microconcepts, and present cognitive activity. The potentiated recruitment framework posits that the primary difference between implicit and explicit attitudes is not that they are the result of different cognitive processes, but

whether deliberative cognitive processing is involved in producing an output attitude.

The metacognitive model of attitudes (Petty, 2006; Petty & Briñol, 2006; Petty, Briñol, & DeMarree, 2007; Petty, Wheeler, & Tormala, 2003) was proposed to account for differences in implicit and explicit attitude change. Like the associative-propositional evaluation and the potentiated recruitment framework, this approach assumes that contemporary implicit measures tap automatic associative evaluations, whereas traditional explicit measures rely on more deliberative information processing involving attitude validity appraisals. According to the metacognitive model, explicit attitudes show greater change than implicit ones when new evaluative associations are accepted and old evaluative associations are rejected, such as when one accepts the idea that classical music is good and rejects the old, negative attitude as invalid. In contrast, implicit attitudes show greater change than explicit ones when new evaluative associations are consciously rejected, such as when one learns that listening to classical music causes brain damage, and then rejects that information. In this example, the brain damage message remains associated with classical music, despite the conscious rejection of that information, and this association should be reflected in implicit measures. Thus, the metacognitive model differs from the associative-propositional-evaluation model (but is similar to the potentiated recruitment framework) in that the formation of attitudes depends not on associative versus propositional processes, but rather on the strength of the evaluative associations and whether the associations are perceived to be valid. Moreover, the metacognitive model allows for both affective (e.g., "I feel good about my attitude toward classical music.") and cognitive (e.g., "My attitude toward classical music is correct.") validation of evaluative associations. The metacognitive model differs from other models in that it allows for both attitudes and validity assessments to be stored in memory rather than constructed online as proposed in the APE model.

The metacognitive model differs from other models in allowing for some degree of implicit-explicit ambivalence when either explicit or implicit attitudes (but not both) change. Petty, Tormala, Briñol, and Jarvis (2006) induced participants' positive or negative attitudes toward initially neutral stimuli. Then, some participants were provided with new information that caused them to change their explicit attitudes toward the targets. These participants' new explicit attitudes were indistinguishable in direction and reported ambivalence from those of participants who did not receive the new information. However, the recipients of new information did show evidence of implicit ambivalence, as manifested by more moderate responses

on implicit attitude measures and more careful processing of attitude-relevant information. These findings suggested that the old explicit attitude continued to have an influence at the implicit level.

The study of implicit attitudes takes us back to the issue of what aspects of the attitude and the environment enter awareness (Fazio & Olson, 2003; Vargas et al., 2007; Vargas & von Hippel, & Petty, 2004; von Hippel, Sekaquaptewa, & Vargas, 2008). Consider, for example, the implicit formation of attitudes (where attitudes are formed outside of conscious awareness but are explicitly available). Evidence has been reported that attitudes can be formed outside of conscious awareness via exposure to value-charged information (Betsch, Plessner, Schwieren, & Gütig, 2001). In one study, participants were instructed to focus on a series of advertisements while the bottom of the screen flashed stock values. Stocks with higher summative values were rated most highly despite participants' inability to consciously estimate sums. In a follow-up study, participants formed attitudes either implicitly or explicitly. Implicitly formed attitudes appeared to be based on a summative assessment of the stimuli, whereas explicitly formed attitudes appeared to be based on an averaging assessment of the stimuli (Betsch, Kaufmann, Lindow, Plessner, & Hoffmann, 2006).

In the end, one of the most important puzzles related to implicit attitudes, as well as priming, may concern how we move from fragmentary environmental cues to a first-person propositional discourse (i.e., how we think and talk to ourselves; Albarracín, Hart, & McCulloch, 2006; Albarracín, Noguchi, & Earl, 2006; Hart & Albarracín, in press; for similar points of view, see Hummel & Holyoak, 2005). On the one hand, the argument that propositional and associative processes are qualitatively different implies a great gap between associating a presidential candidate with pleasant objects such as babies and learning that a presidential candidate supports pro-environment policies. On the other hand, the processes involved in understanding a verbal proposition are not diametrically different from those underlying simpler associations. For example, different word prime orders (e.g., "act-nice" vs. "nice-act") evoke different logical structures (a command vs. a compliment) in an unintentional way (Albarracín, Noguchi, & Earl, 2006; for related findings, see Hart & Albarracín, 2009). From this point of view, propositions are understood by means of associative processes much like those observed in simple automatic associations between an object (e.g., a snake) and an attribute (e.g., bad).

### Direct Experiences

Having direct experience with an attitude object is perhaps the most basic, and obvious, way in which we form attitudes.

Direct experience is implicit in much of the research reviewed in this section and appears to strongly influence the likelihood that an attitude would be sufficiently arousing as to be activated when the object is encountered. In one study, some participants were allowed to play with examples of five types of puzzles (direct experience); however, other participants were presented with examples of the types of puzzles already solved by another person (no direct experience = no action). All participants later indicated how interesting they found each type of puzzle. After that, they were all allowed to play with the puzzles for up to 15 minutes. The results from this study indicated that attitudes (the interest ratings) were stronger predictors of actual behavior in the direct than indirect experience condition (Regan & Fazio, 1977).

Fazio and his colleagues (1983) have suggested that direct experience produces high attitude-behavior correlations because attitudes formed from direct experience are easier to retrieve from permanent memory. Thus, direct experience may be analogous to repeatedly expressing or reporting one's attitude. A meta-analysis of the behavioral impact of recently formed attitudes (Glasman & Albarracín, 2006; see also Kraus, 1995) confirmed this possibility. That is, direct experience and repeated expression/report of the attitude were correlated with faster reporting of attitudes (for direct experience,  $r = .60$ ; for repeated expression,  $r = .24$ ; Glasman & Albarracín, 2006). Moreover, the influence of direct experience and attitude report on the attitude-behavior relation was mediated by response speed (from direct experience to response speed,  $r = .43$ ; from response speed to the attitude-behavior correlation,  $r = .82$ ).

Direct experience may also have a motivational effect, leading people to form an attitude while the experience develops. For one thing, direct experience does not improve attitude-behavior correspondence when the bases for attitudes and the behavior are different. For example, an attitude based on experienced feelings, such as how much pleasure is associated with a video game (an affective experience), does not predict the use (or lack of use) of this video game for career advancement or learning purposes (an instrumental behavior; Millar & Tesser, 1986). Indeed, the attitude behavior correlation is  $r = .59$  when the experience with the attitude and the predicted behavior are similar (both instrumental or both affective), but  $r = .39$  when the two are dissimilar; Glasman & Albarracín, 2006). Second, as Hoch and Ha (1986; see also Ha & Hoch, 1989; Wooten & Reed, 1998) and Albarracín and McNatt (2005) demonstrated, acquiring direct experience with the object is as important in guiding behavior as receiving information that is unambiguous and consistent (i.e., evaluative diagnosticity; Reed, Wooten, &

Bolton, 2002). When all else is equal, direct experience should stimulate the use of a resulting summary attitude as a basis for future behavior. However, direct experience can sometimes provide mixed evidence about the desirability of an object (e.g., people are presented with neutrally valenced information, Reed et al., 2002, or products with standard qualities, Hoch & Ha, 1986). In these conditions, direct experience actually hinders attitude-behavior correspondence (Albarracín & McNatt, 2005; Glasman & Albarracín, 2006).

The ubiquity of broadband Internet has facilitated virtual simulations of experiences. For example, one no longer has to actually get a haircut to experience the new look. Instead, one can purchase computer programs that digitally alter one's image in accordance with the planned hairstyle. In a study of *virtual* direct experience (Griffith & Chen, 2004), some products, such as movies and music, were easy to experience in a digital fashion. Participants were simply presented with ads about these products and did or did not view the product. Other products, such as clothes and apparel, are more difficult to experience virtually. Still, the researchers created movie clips of the actual experience of, for example, viewing objects with a fictitious pair of sunglasses. Thus, for these products as well, some conditions allowed for viewing (virtual experience present), whereas others did not (virtual experience absent). The results from this study indicated that when the experience was easy to digitalize, virtually experiencing and not experiencing the product had different effects. Participants had more positive evaluations and stronger intentions to buy the product after the virtual viewing than in the absence of virtual viewing. However, these effects disappeared when the products were difficult to digitalize, in which case, attitudes and purchasing intentions were the same with and without the virtual experience.

## Summary

Most of the processes studied by attitude researchers have concerned the influence of environmental information on attitudes, ranging from subliminal persuasion to the effects of direct experience. Both implicit attitudinal responses and explicit propositions about objects are affected when a person interacts with the surrounding world, and scholars have attempted to understand the nature of these influences. Sometimes attitudes form through mere exposure, with repeated presentation of a stimulus but little direct contact with the object. Other times, attitudes form and change through direct and even virtual experience, and these attitudes appear to be highly consequential for future behavior.



## ATTITUDES IN REACTION TO A SEEMINGLY ACTIVE ENVIRONMENT

More than half of Americans believe that primates deserve the same rights as human children, according to a survey commissioned by The Doris Day Animal League, a group devoted to furthering the cause of animal rights. In 1999, two thirds of Americans wanted Congress to consider a second impeachment trial against then-President Clinton, according to a survey commissioned by the right-wing Newsmax website. And two thirds of likely voters support privatizing social security accounts, according to a survey commissioned by the libertarian Cato Institute. All of these findings have been presented as “facts” but were essentially purchased by the groups funding the surveys (Mooney, 2003). And the report on these suspect survey practices was published by an admittedly left-leaning periodical, *The American Prospect*.

Although environmental influences are often undetected, people are often aware that information sources frequently spin the facts. Therefore, information recipients are used to selecting information, questioning source credibility, and suspecting persuasive, if not overly manipulative, intent (although we tend to do so most often when we are faced with undesirable conclusions; see Hart et al., 2009; Kunda, 1990). Social psychologists have been prolific in tackling these phenomena in the context of selective exposure, communicator-based persuasion, psychological reactance, forewarning of influence, resistance to persuasion, and communication pragmatics.

### Selective Exposure

The availability of diverse information in an environment does not guarantee that a person's attitudes will be equally diverse. A former United States vice president, for example, reportedly requested that the television always be tuned to a conservative news channel before he entered a hotel room (Dick Cheney's Suite Demands, 2006). In selective exposure research, the classic assumption to explain such reactions is that people are motivated to defend their attitudes from challenges (e.g., Festinger, 1957; Olson & Stone, 2005). Selective exposure enables people to defend their attitudes by avoiding information likely to challenge them and seeking information likely to support them. Selectivity of this type is known as a *congeniality bias*.

A recent meta-analysis assessed whether exposure to information is guided by defense or accuracy motives (Hart et al., 2009; see also Noguchi, Durantini, Albarracín, & Glasman, 2007). The studies examined information preferences in relation to attitudes, beliefs, and behaviors in situations that provided choices between congenial

information, which supported participants' preexisting attitudes, beliefs, or behaviors, and uncongenial information, which challenged these tendencies. Although analyses indicated a moderate preference for congenial over uncongenial information ( $d = .36$ ), this congeniality bias was moderated by variables that affect the strength of defense and accuracy motivation. In support of the importance of defense motivation, the congeniality bias was weaker when participants' attitudes, beliefs, or behaviors were supported before information selection; when participants' attitudes, beliefs, or behaviors were not relevant to important values or not held with conviction; when the available information was low in quality; when participants' closed-mindedness was low; and when confidence in the attitude, belief, or behavior was high. In support of the importance of accuracy motivation, an uncongeniality bias emerged when uncongenial information was relevant to accomplishing a current goal.

Confidence in how one interacts with active environments seems to be a powerful influence on information selection. History presents abundant examples that people who strongly advocate and defend a given attitudinal position often change this position, becoming “converted” to points of view that are opposite to the ones they initially held. One reason for such changes is the degree to which individuals perceive that they can defend their attitudes from attack (Albarracín & Mitchell, 2004; Albarracín, Wang, & Albarracín, in press). Presumably, people who are confident that their attitudes will survive future challenges are more willing to examine evidence that both supports and contradicts their prior attitudes (e.g.,  $r$  between prior attitudes and selection of consistent material = .35 for high trait defensive confidence, from Albarracín & Mitchell, 2004, study 3; see also J. Albarracín et al., in press). In contrast, people who doubt their defensive ability prefer proattitudinal information over materials that challenge their prior perspectives (e.g.,  $r$  between prior attitudes and selection of consistent material = .80 for low trait defensive confidence, from Albarracín & Mitchell, 2004, study 3; see also Albarracín, 2002; J. Albarracín et al., in press; see also Byrne, 1961; Olson & Zanna, 1982; for related views in other domains, see Tesser, 2001). Although denial may in many ways be a relatively primitive defense mechanism, avoiding counterattitudinal information preserves the attitudes of people who doubt their defensive abilities (Albarracín & Mitchell, 2004; J. Albarracín et al., in press).

### Source Credibility

Other demonstrations of reactions to a seemingly active environment involve the effects of source credibility. Initial work on persuasion suggested that persuasion increases



in the presence of source reinforcers such as expertise, trustworthiness, and likability (see Cialdini, 2001; Hovland & Janis, 1959; Johnson, Maio, & Smith-McLalle, 2005). In fact, the power of variables such as source credibility is such that the influence of experts facilitating behavioral interventions to reduce HIV infection exceeds that of peers in almost every population group (women and men, ethnic majority and minority; Durantini, Albarracín, Earl, & Mitchell, 2006; e.g., behavior change mean  $d = .46$  vs.  $.14$  for experts vs. peers in adult samples). Moreover, these expertise effects are more stable across populations than the effects of the content of behavioral interventions (Albarracín, McNatt, et al., 2003; Albarracín, Gillette, et al., 2005; Albarracín, Durantini, & Earl, 2006) and *are* mediated by the creation of positive behavioral norms. For example, among female and African American samples, source expertise correlated an average  $r$  of  $.50$  with social norms, and social norms correlated an average  $r$  of  $.65$  with behavior change.

Source characteristics are often used as simple cues to either accept or reject a communication without much scrutiny of the offered arguments (Chaiken, 1987; Livingston, 2001; Petty & Wegener, 1998). That is, by applying the heuristic that "experts can be trusted," people can circumvent effortful decisions about the validity of the actual message arguments (Chaiken, 1987). This heuristic mode of processing requires an accessible heuristic and a readily available cue but can otherwise be applied under varying conditions of motivation and ability to process the communication (Chaiken, 1987; for a review, see Johnson et al., 2005).

Despite the importance of heuristic influences of source credibility, the processes triggered by a credible or trustworthy source turn out to be fairly complex (Petty & Wegener, 1998). For example, source credibility has a much stronger influence on attitudes when message recipients form attitudes toward new topics than when they change attitudes toward well-known topics (e.g., mean  $d = .73$  and  $.33$ ; Kumkale, Albarracín, & Poyner-del Vento, in press). In addition, the effect of source credibility depends on when the information is presented. When the source is presented before the message arguments, expertise can bias the way in which the arguments are processed (Heesacker, Petty, & Cacioppo, 1983; Kumkale & Albarracín 2004; Petty & Cacioppo, 1986; Petty & Wegener, 1998; see also Albarracín, Wallace, & Glasman, 2004). Recipients are likely to dismiss arguments coming from a noncredible source but attend to those coming from a credible one (Kumkale & Albarracín, 2004; Petty & Cacioppo, 1986). In contrast, when presented after the message arguments, the source can offer a heuristic for accepting or rejecting the message. In this situation, the effect of the source is fairly superficial and short lived because the source information is not integrated into the message representation (Kumkale & Albarracín, 2004).

Other moderators of the effects of source credibility are involvement and amount of source information available. For example, in one study, participants were presented with an educational policy that would either affect them or not. In addition, the source description, which was either 1 page or 50 words in length, introduced an expert in testing (high-credibility condition) or an expert in fitness (low-credibility condition). As expected, the influence of the source depended on both involvement and description length. Brief source descriptions had greater impact than argument quality when involvement was low, but long descriptions had the same impact as the communication arguments when involvement was high. In other words, long source descriptions were processed as a persuasive argument, requiring high processing motivation (Pierro, Mannetti, Erb, Spiegel, & Kruglanski, 2005).

Despite considerable reliance on personal source information, the actual message presented by a source may be more revealing than message recipients' attributions about source credibility. People believe that facial cues such as deviated gaze provide access to a source's deception but are better at judging credibility in the absence of such cues (DePaulo, Stone, & Lassiter, 1985; Zuckerman, DePaulo, & Rosenthal, 1981; Zuckerman & Driver, 1985). More useful information about deception is transmitted in speech errors and hesitations than in facial expressions. Although very strong motivation to lie appears to produce facial cues that experts at lie detection can identify (DePaulo & Friedman, 1999), people who lack objective information about a source are generally better off turning to the message for reliable credibility information.

### Belief and Evaluations of the Content of Persuasive Messages

Propositional reasoning has been a classic topic for social psychologists who study persuasion. For example, Hovland (1959), McGuire (1968, 1985), and Wyer (1974) all contributed to the current understanding of the sequence of activities that take place when people process a persuasive message (see Albarracín, 2002; Johnson et al., 2005; Kruglanski & Stroebe, 2005; Wyer & Albarracín, 2005). Hovland proposed that the processing of a persuasive message involves three phases: (1) attention, (2) comprehension, and (3) acceptance of the message content. Attention and comprehension concern learning or content retention, whereas acceptance involves motivation (e.g., rewards) to accept or reject the message conclusion.

Hovland's (1959) distinction of these three phases of influence was critical to analyze a number of phenomena. For example, extreme fear appeals increase attention to the

message content but defeat themselves by inducing anxiety (Janis & Millholland, 1954). Consistent with this idea, research on the effects of campaigns to reduce HIV risk and improve attitudes toward protection has demonstrated greater efficacy when fear-inducing arguments are absent rather than present (Albarracín, McNatt, et al., 2003; Albarracín, Gillette, et al., 2005; Earl & Albarracín, 2007). Brain activity, as measured by event-related potentials, suggests that fear-inducing messages cause people to avert their attention away from the message (Ruiter, Kessels, Jansma, & Brug, 2006).

McGuire (1968, 1972) developed Hovland's (1959) theorizing by capitalizing on a cognitive perspective that delineates a series of information-processing stages (see Albarracín, 2002; Johnson et al., 2005; Kruglanski & Stroebe, 2005; Wyer & Albarracín, 2005). These stages include: (1) exposure (i.e.,  $E$ ), (2) attention ( $A$ ), (3) comprehension ( $C$ ), (4) yielding ( $Y$ ), (5) retention ( $R$ ), and (6) behavior ( $B$ ). Messages can be effective only if presented to potential recipients, who themselves attend to and comprehend the conclusions and arguments discussed in the message. Recipients must also agree with the conclusion of the communication, retain this yielding over a period of time, and behave in the manner recommended by the communication. As a result, the success of the message can depend on its behavioral impact. That is,

$$P_I = P_E \times P_A \times P_C \times P_Y \times P_R \times P_B \quad [1],$$

where  $P_I$  is the probability of influence of the persuasive message, and the remaining probabilities are associated with the previously defined stages.

Later, McGuire (1968) generated a simpler version of his stage model (see Albarracín, 2002; Johnson et al., 2005; Kruglanski & Stroebe, 2005; Wyer & Albarracín, 2005). With the methods available at the time, he observed difficulties in measuring attention and comprehension as separate processes, and synthesized these processes as well as exposure under the overall label of "reception" ( $R$ ). With this reduction,

$$P_I = P_R \times P_Y \quad [2],$$

where the probability of influence is a multiplicative function of the probability of receiving the message and the probability of yielding to the message. This two-step model has important empirical implications. In particular, when a situational or personal factor has the same influence on both reception and yielding, the factor's influence should be monotonic. In contrast, when a factor has opposite influences on reception and yielding, the factor's influence should be curvilinear. For example, more intelligent

people presumably attend to a message and understand its arguments but also counterargue more than less intelligent people. Ultimately, these opposite influences predict that people of moderate intelligence should be more persuadable than people of either low or high intelligence (see Johnson et al., 2005; Kruglanski & Stroebe, 2005; Wyer & Albarracín, 2005).

Wyer (1974) further elaborated McGuire's (1972) model using conditional probabilities (see Albarracín, 2002; Johnson et al., 2005; Kruglanski & Stroebe, 2005; Wyer & Albarracín, 2005). In the new context, the probability of a message's influence is a function of the probability of being influenced given that one receives the communication plus the probability of being influenced when one does not receive it. That is,

$$P_I = P_R P_{IR} + P_{\bar{R}} P_{I\bar{R}} \quad [3].$$

The probability of being influenced, assuming that one receives the communication, can be rewritten as the probability of yielding. Yielding, in turn, depends on the probability of yielding when one successfully counterargues the communication ( $P_{Y/CA}$ ), as well as the probability of yielding when one fails to refute it ( $P_{Y/\bar{CA}}$ ). Then, Equation 3 can be restated as follows:

$$P_I = P_R(P_{CA} P_{Y/CA} + P_{\bar{CA}} P_{Y/\bar{CA}}) + P_{\bar{R}} P_{I\bar{R}} \quad [4].$$

In this equation, the parenthetical term is a function of the strength of the arguments in the message (see Petty & Cacioppo, 1986). Stronger arguments should induce less counterarguing, and thus be more persuasive, but other factors may influence yielding and counterarguing as well. For example, the affect recipients experience for reasons unrelated to the persuasive message can increase or decrease yielding (see e.g., Albarracín & Wyer, 2001; Albarracín, 2002), making the message persuasive irrespective of counterarguing ( $P_{Y/CA} = P_{Y/\bar{CA}}$ ).

Since 2000, researchers have tried to specify with greater detail the processes involved in yielding (Albarracín, 2002; Albarracín & Wyer, 2000, 2001; Brown & Albarracín, 2005; Crano & Prislin, 2005). In some formulations, the implications of both message-related and knowledge-based beliefs and evaluations combine to form an attitude ( $A$ ). This combination may be done in the manner postulated by Fishbein and Ajzen (1975; see Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Ajzen & Fishbein, 2005). That is,

$$A = \sum be \quad [5],$$

where  $A$  is attitude,  $b$  is a belief in an outcome or attribute, and  $e$  is the evaluation of this outcome or attribute. This

attitude, together with other possible factors (e.g., social norms or perceptions of control; see Ajzen & Madden, 1986; Fishbein & Ajzen, 1975) then influences the recipients' intention to perform the behavior (e.g., average  $r$  between attitude and intention = .58; Albarracín et al., 2001). Later, this intention provides the basis for their future actions (see also McGuire, 1985; e.g., average  $r$  between intention and behavior = .45; Albarracín et al., 2001).

One question relevant to message processing is whether outcome-specific beliefs are formed before the outcomes are evaluated or afterward. Over three experiments, Albarracín and Wyer (2001) found that people who are able to think about the arguments contained in the message first form beliefs and evaluations of behavioral outcomes and then integrate the implications of these cognitions into their attitudes. In one of these studies, for example, the time taken to report outcome-specific beliefs and evaluations was analyzed as a function of presentation order and type of reported cognition (beliefs vs. evaluations). Outcome beliefs and outcome evaluations were, on average, reported equally quickly, but evaluations were made more quickly when beliefs had been reported beforehand than when they had not. Thus, these findings provided some support for the hypothesis that outcome beliefs are formed before outcome evaluations (see also Gilbert, 1991).

Details about the type and order of cognitions that follow a persuasive message nicely complement classic findings from the *elaboration likelihood model* (ELM; Petty & Cacioppo, 1981, 1986). The ELM is a theory about how cognitive processes mediate the relation between persuasive stimuli and actual persuasion. According to this model, message recipients' cognitive responses to persuasive messages can vary along a continuum of elaboration likelihood. When people are both motivated and able to think carefully about the message (i.e., they engage in high elaboration), they tend to scrutinize central issues, such as the quality of the arguments presented in a message. This processing is also known as the "central route" to persuasion. If people lack either motivation or ability (i.e., they engage in low elaboration), they tend to rely on factors other than their thoughts about the central issues, such as characteristics of the person delivering the message. This processing is also known as the "peripheral route" to persuasion. Both central and peripheral routes (or high and low elaboration, respectively) can lead to persuasion, but central route processing generally leads to stronger attitudes that are more carefully integrated with extant cognitive structures, more resistant to subsequent persuasive attacks, and more likely to guide behavior.

The ELM has been used to organize different approaches to studying attitude change into high- and low-effort processes (Petty & Wegener, 1998). High-effort

processes include message-learning approaches and expectancy value approaches, such as those described earlier, as well as information integration theory (Anderson, 1971, 1981), and even cognitive dissonance theory. Low-effort processes include classical conditioning and EC, self-perception theory (Bem, 1972), and mere exposure. In addition, the ELM has been used to organize different ways in which persuasion-related variables (source, message, recipient, context) can impact attitude change (Petty & Wegener, 1998). First, persuasion-related variables may serve as "arguments relevant to determining the merits of an object or position," such as when an attractive source endorses a cosmetic product. The source's attractiveness may serve as an argument supporting the efficacy of the product (Shavitt, Swan, Lowery, & Wänke, 1994). Second, variables may also bias attitude-relevant information processing, such as when an attractive source causes people to interpret neutral information more favorably. Third, variables can serve as peripheral cues, such as when an attractive source is judged reason enough to buy a product (Cialdini, 1987). And fourth, variables can influence the amount of cognitive elaboration in which people engage, such as when an attractive source causes people to attend more carefully to the central arguments in a persuasive message (DeBono & Harnish, 1988; Puckett, Petty, Cacioppo, & Fisher, 1983). In general, the ELM framework has been an exceptionally powerful and robust approach to the study of persuasion.

### Power, Authority, and Social Influence

Power has been conceptualized as the ability to influence another via control of resources or punishments (for reviews see Fiske, volume 2; French & Raven, 1959; Kelman, 1958; Keltner, Gruenfeld, & Anderson, 2003; for an alternate perspective see Turner, 2005). Although power may belong to the persuading agent, the message recipient, or both, most research on the relation between power and persuasion has focused on the power of the persuading agent (e.g., Festinger & Thibaut, 1951) and how that power affects attitude change.

French and Raven (1959) differentiated five sources of power. *Legitimate* power reflects the recipient's belief that the influencing agent has a right to direct behavior, as when a police officer directs traffic. *Referent* power reflects the recipient's liking of, or "feeling of oneness" (p. 161), with the agent, exemplified by the power of an admired celebrity to influence purchasing decisions. *Expert* power reflects the recipient's belief that the agent has superlative skills or knowledge, or both, as in a typical student-teacher relationship. *Reward* and *coercive* power reflect the agent's ability to administer rewards and punishments, respectively.

A sixth source, *informational power*, is not derived from perceptions of the source but rather the information delivered by a source, such as the quality of the arguments (Deutsch & Gerard, 1955; Raven, 1965).

Kelman (1958, 1961, 1974, 2006) proposed three processes of influence. *Compliance* is a form of public acceptance in which recipients change their attitudes to gain a favorable (or prevent an unfavorable) response from the agent. Attitude change because of compliance is unlikely to be permanent, being present only in front of the agent and potentially producing private rejection (Brehm & Brehm, 1981). *Identification* may elicit private acceptance through the recipient's desire to "establish or maintain a positive self-defining relationship to another person or a group," (Kelman, 1958, p. 53). Attitude change because of identification is likely to persist to the extent that the relationship with the agent is salient. *Internalization* elicits private acceptance because the recipient finds the ideas or behaviors, or both, intrinsically appealing and consistent with the recipient's values. Attitude change because of internalization persists beyond the recipient's relationship with the agent.

Although relatively little work has been done on the effect of the power of the message recipient, there has been work on the influence of power on the power holder. Drawing on research on BIS/BAS, and Higgins's (1997, 1999) work on regulatory focus, Keltner et al. (2003) proposed that increased power activates approach-related tendencies (e.g., increased sensitivity to rewards, positive affect, automatic social cognition), and that decreased power activates avoidance tendencies (e.g., increased sensitivity to punishment, negative affect, controlled social cognition). Message recipients who feel powerful may become more confident in their prior attitudes or become more likely to agree with the message advocacy (Briñol, Petty, Valle, Rucker, & Becerra, 2007). Recipients made to feel powerful before the persuasive attempt resisted persuasion because they felt confident in their preexisting ideas. In contrast, recipients made to feel powerful after a persuasive attempt were more persuaded because they felt confident in the new ideas engendered by the persuasive message.

The source of information people use as a basis for behavior also appears to vary with the actual social power (access to resources) of an audience (Albarracín, Durantini, & Earl, 2006; Albarracín, Gillette, et al., 2005; Albarracín, Kumkale, & Johnson, 2004; Durantini et al., 2006). For example, the less power a population has (ethnic minority, women, impoverished groups), the more important skills and actual resource provision become (Albarracín, Gillette, et al., 2005). For example, ethnic minority audiences increase their condom use behavior more when they

undergo training in skills (e.g., planning) that allow them to overcome environmental obstacles than when they do not (for audiences with African background, average  $d = .58$  vs.  $.16$  when this training is and is not present; Albarracín, Gillette, et al., 2005). These aspects, however, are not as important to the less deprived ethnic majority groups (for audiences with European background, average  $d = .35$  vs.  $.05$  when this training is and is not present; Albarracín, Gillette, et al., 2005). In addition, samples with lower social power change their behavior more in response to expert than lay sources, presumably because professional experts are a door to resources (Durantini et al., 2006). Specifically, when experts (e.g., physicians, nurses, and psychologists) deliver a behavior-change program, the average behavior-change  $d$  values are  $.44$  and  $.35$  for predominantly African-background and female audiences, respectively (Durantini et al., 2006). In contrast, when lay community members (e.g., peer counselors) deliver a behavior-change program, the average behavior-change  $d$  values are  $.14$  and  $.15$  for predominantly African-background and female audiences, respectively (Durantini et al., 2006).

Even the style of the message itself may be characterized as powerful or powerless, independent of the quality or substance of the arguments. A powerless message may include tag questions (e.g., "isn't that right?"), as well as verbal and nonverbal hesitations (e.g., "let's see here" and "um"), which are absent in powerful messages. Important for our analysis, powerless messages tend to evoke less favorable attitudes than powerful ones (Areni & Sparks, 2005; Sparks & Areni, 2008).

Finally, power is closely related to authority, another characteristic that can have a profound influence on attitudinal and behavioral change. An authority is a figure who has acquired special status through experience, education, special talents, or other means (Cialdini, 2001). An authority may not have the ability to directly administer rewards or punishments (e.g., the author of a book on astronomy) but may nevertheless be perceived as a legitimate source of information and behavioral guide. Milgram's (1963, 1974) famous research on obedience to authority demonstrated the profound impact of authorities on behavior, if not attitudes (see also Bickman, 1974; Doob & Gross, 1968; Hofling, Brozman, Dalrymple, Graves, & Pierce, 1966; Lefkowitz, Blake, & Mouton, 1955). Despite much past research in this area, relatively little work has been done in recent years, and many of Kelman's hypotheses about power remain untested (Kelman, 2006). As operationalizations of authority are relatively easy to create (e.g., uniforms, titles; see Cialdini, 2001), the attitudinal impact of authority is an area that should continue to attract attention in the years to come.

### Psychological Reactance

Perhaps the most provocative statement about people's attitudinal responses to a seemingly active environment comes from the theory of psychological reactance (Brehm, 1966; Brehm & Sensenig, 1966). According to this view, when a person feels free to enact a given behavior, eliminating or threatening to eliminate this freedom can instill psychological reactance. For example, constraints to freely choosing between A and B may arise if one is told to choose A as opposed to B. The reactance associated with a mild constraint (on a single choice) may increase consideration of A as potentially better than B. The reactance associated with a high degree of constraint, however, may trigger rejection of A over B. In Brehm and Sensenig's (1966) classic study, participants were asked to choose between pairs of paintings and were told that another person had written his or her choices of paintings. In the control condition, the note simply stated, "I prefer A (or B);" in the threat condition, the note stated, "I think we should both choose A (or B)." In addition, the threat condition could be about only one pair (low implication) or all pairs (high implication). The results from this seminal study indicated persuasion in the threat conditions. When the note simply stated a preference, then participants were likely to go along with it. In the threat conditions, however, the pattern differed. Participants were equally likely to choose A or B in the low-implication condition ( $OR = .67$ ) but more likely to choose B in the high-implication condition ( $OR = .47$ ). In summary, unambiguous reactance emerged when the choices on all pairs of paintings were constrained.

Considerable evidence has accumulated in support of psychological reactance. In particular, there is little defiance when people reaffirm their freedom by channels other than resistance, including restoration of their freedom by another (Worchel & Brehm, 1971), prior exercise of their freedom (Snyder & Wicklund, 1976), and exercise of choice with respect to the form of compliance (Heilman & Garner, 1975). Nonetheless, it is possible that people's defiance is a public maneuver to avoid the impression of being easily manipulated (Brehm & Mann, 1975; Heilman & Garner, 1975). This possibility has received mixed support, going from finding similar effects of coercion on publicly and privately expressed decisions (Brehm & Mann, 1975) to finding reduced reactance only when the manipulator is aware of other free choices by the actor (Baer, Hinkle, Smith, & Fenton, 1980).

Anticipated regret has also been implicated in defiance of coercion, but there has been no support for this possibility. Crawford, McConnell, Lewis, and Sherman (2002) observed that anticipated regret could explain the phenomenon if people expect greater regret from following

somebody else's rather than their own decisions. According to predictions, participants who reported regret anticipated greater regret about negative outcomes following defiance than compliance. Nonetheless, these participants actually complied with the other person's choices, whereas nonreporters displayed the typical reactance effect. In summary, although cognitive mechanisms coexist with a pure interpersonal effect, research to date has failed to substantiate a role for anticipated regret.

Cognitive mechanisms that have received support, however, include counterarguing and perceptions of source credibility. Silvia (2006) investigated these processes by manipulating the order of presentation of the coercion (see earlier section on Source Credibility; Kumkale & Albarracín, 2004). Two persuasive messages were designed to persuade recipients of a choice of major. Half of the participants were instructed to agree with the recommendation at the beginning of the message and half at the end of the message. When the freedom-threatening statement was at the beginning, the influence of the threat versus control message was mediated by counterarguments and perceptions that the source was untrustworthy and inexperienced. At the moment, it is not clear whether these cognitive responses comprise a motivated attempt to regain freedom or a cold inference based on an unfavorable impression of the communicator. Given current attention to cold and hot reasoning processes, however, future work is likely to provide further answers to this important question.

Silvia (2006) also found a direct influence of the threat on agreement when the coercive statement was at the end. However, interpretational ambiguities exist with a direct effect when only counterarguments are measured ("Were you criticizing the essay while you were reading it?"). Without requesting cognitive responses more broadly, it is unclear whether message recipients were consciously aware of the persuasive intent, and if so, whether they were aware of their reactance to it. In a study of organ donation (Reinhart, Marshall, Feeley & Tutzauer, 2007), loss-frame messages emphasizing the number of lost lives in the absence of donation were compared with gain-frame messages emphasizing the number of saved lives in the presence of donation. In this study, both reported psychological reactance ("It irritates me that the message told me how to feel about organ and tissue donation," Reinhart et al., 2007, p. 251) and perceived persuasive intent ("The creator of this message tried to manipulate me in ways I did not like," Reinhart et al., 2007, p. 251) mediated the influence of framing on favorable reactions to the message (a mixture of feelings about and perceived importance of the issue, and attitudes toward the message).

It is nevertheless unlikely that reactance requires awareness. Contrary to Reinhart et al.'s (2007) studies, which were conducted with undergraduates, other studies suggest that reactance may emerge with a lack of awareness. Studies conducted in the general population have recently uncovered reactance-type effects without any evidence of awareness of experienced reactance. For example, a field study conducted by Albarracín, Durantini, Earl, Gunnoe, and Leeper, (2008), showed that when health-promotion counseling was offered by deemphasizing the likelihood of behavior change, enrollment in the program was greater than when behavior change was emphasized (e.g., 60% vs. 41% enrollment). However, items measuring the degree to which the offer was imposing failed to mediate the effect of the program introduction on enrollment. Moreover, as being subliminally exposed to the name of a controlling significant other seems to elicit reactance (Chartrand, Dalton, & Fitzsimons, 2007), reactance may unfold in an automatic fashion.

### Forewarning of Influence Intent

People who are forewarned of an upcoming influence attempt are sometimes more likely to resist this influence (for more on influence, see Hogg, volume 2). For example, Dean, Austin, and Watts (1971, study 1) either did or did not inform participants that they would rate how persuaded they were after receiving a message (i.e., a forewarning of persuasive intent). The importance of the topic (presidential elections vs. a health issue) varied, as did the high or low status of the source. Interestingly, forewarning decreased persuasion by the high-status source but not by the low-status source.

A meta-analysis of the forewarning literature (Wood & Quinn, 2003), however, has clarified the contribution of involvement to forewarning effects. In this meta-analysis, there was an average shift in line with the expected message of  $d = .37$ , but the effect was highly variable. Three pooled studies indicated that forewarning produced resistance (a boomerang effect of the message) when involvement was high but slight agreement when involvement was low. According to the authors, while one awaits a believed-to-be-persuasive message, both resisting and agreeing can serve to reduce the threat posed by impending attacks against personal attitudes. This moderating effect raises questions about the processes elicited by forewarning. Resistance may actively recruit counterarguments, thus requiring motivation to produce specific thoughts (Petty & Cacioppo, 1986). Alternatively, people may need involvement to reject the message without further elaboration. For example, if identifying and then discounting the influence each require increasing levels of ability (Albarracín & Kumkale, 2003; Gilbert, 1991; Gilbert, Tafarodi, &

Malone, 1993), then low involvement may produce a positive effect via identification, whereas high involvement may produce a negative effect via discounting. Following Albarracín and Kumkale's (2003) logic, future research may reveal that further decreases in motivation or ability to think about this influence actually eliminates forewarning effects.

### Resistance to Persuasion

Perceiving persuasive intent is generally sufficient for a host of resistance processes to unfold. Audiences abandon the communicator and avoid similar messages in the future (Festinger, 1964; Hart et al., 2009), and actively counterargue the message in an attempt to resist its influence (Sagarin & Cialdini, 2004; Wegener & Carlston, 2005). Interestingly, the initial research on attempts to counter an external influence had the objective of studying experimental participants who act contrary to the experimenter's hypothesis (Weber & Cook, 1972). Masling (1966) described this effect as a participant's "screw you" reaction to the suspicion that the experimenter is attempting to control their minds. In a classic set of two studies (Christensen, 1977), participants were induced to suspect, actually experience, or neither suspect nor experience psychological manipulation. In the suspicion condition, the experimenter stated that psychological experiments often include procedures to manipulate behavior without the participants' knowledge. In the experience condition, participants were asked to copy telephone numbers. While participants wrote numbers, the experimenter told them that fast copying was indicative of an obsessive-compulsive personality disorder, which they later learned was a calculated strategy to diminish their performance. The third condition had neither instructions nor experience manipulations. Participants in these three conditions then underwent a verbal conditioning task (Taffel, 1955) during which the experimenter attempted to condition some responses by repeating "good." The experimenter's statements should normally increase the occurrence of the reinforced responses, but participants' resistance may actually eliminate this effect. As expected, participants were conditioned only when participants did not have a recent manipulative experience.

The fascinating phenomenon of resistance to an external influence eventually received the attention of social psychologists. For example, McGuire (1964) directly manipulated the motivation to self-defend from a persuasive message by having participants counterargue weak forms of the message before a subsequent stronger attack. According to him, the process of counterarguing should not only increase refutational ability but also the motivation to self-defend from the attack. Although the two

processes could not be disentangled in McGuire's work, the refutational practice did, in fact, decrease vulnerability to a subsequent attack.

Recent work by Sagarin, Cialdini, Rice, and Serna (2002) has advanced our understanding of the role of motivation in defending our attitudes against influence attempts. Participants received training for discriminating between legitimate and illegitimate sources based on whether the source has expertise in a particular domain. This treatment was designed to leave participants aware that there was a potential influence source, able to discriminate between legitimate and illegitimate sources, and also willing to make this discrimination. As predicted, the treatment increased persuasion for legitimate sources and decreased it for illegitimate sources. Other studies of the same series confirmed that the perception of undue manipulative intent decreased persuasion directly and by mediating influences on specific counterarguments of the message content. This conclusion was also consistent with independent findings that distrusting a source engenders automatic semantic associations that are incongruent with the source's message (Schul, Mayo, & Burnstein, 2004).

Sources of influence may also be rejected when they are perceived as being hypocritical. More than 1,500 inner-city high-school students were assigned to different conditions of an HIV prevention-intervention trial: The key conditions were a teacher-led intervention and a student-led intervention (Fisher, Fisher, Bryan, & Misovich, 2002). Findings revealed that, compared with the teacher-led intervention, the peer-led intervention was more effective at the 3-month follow-up but less effective at the 1-year follow-up. Apparently, over the course of a year, the student interventionists were perceived as hypocritical because they displayed some of the behaviors they had previously tried to discourage in their peers. This perception of the source as hypocritical presumably decreased the effectiveness of the peer-led intervention.

### Reflecting on Resistance and Cognitive Dissonance

Another interesting facet of reacting against a seemingly active environment is that the influence source provides an anchor for reflecting about attitudes. Rucker and Petty (2002) presented participants with a strong ad promoting a pharmaceutical product and instructed participants either to list negative thoughts (for an introduction to the technique to induce biased thoughts, see Killeya & Johnson, 1998) or to simply list their thoughts about the message. Presumably, participants who listed only negative thoughts attempted to resist the communication to a greater extent

than those who were free to list any (positive, negative, and/or neutral) thoughts. Findings indicated that participants were persuaded regardless of what thoughts they listed, probably because the ad was difficult to refute. However, participants who attempted to resist the message (and failed) were more confident in their favorable attitude toward the product than those who did not make an effort to resist persuasion (see also Schwarz et al., 1991). In other words, confidence was established in relation to prior reactions to the message.

Research conducted by Albarracín, Cohen, and Kumkale (2003) also suggests that message recipients consider the degree to which a prior message was persuasive. In this research, participants received a message that recommended either abstinence from or moderation in the use of a new alcohol-type of product. After reading these materials, participants either tried the product or performed a filler task before reporting their intentions to drink in the future. As predicted, participants who did not try the product reported similar intentions to drink when they received the moderation message and when they received the abstinence message ( $d = .03$ ). In contrast, when participants tried the product after receiving the message, recipients of the abstinence message had significantly stronger intentions to drink than recipients of the moderation message ( $d = .76$ ). One interpretation of these results is that participants inferred their intentions after considering their trial behavior vis-à-vis an external influence (the message recommendation). Apparently, trying the product after a strong recommendation led participants to conclude that they truly liked the forbidden product. Another potential interpretation is that the discrepancy made people anxious and thus more likely to resolve these feelings by justifying their drinking behavior (Festinger & Carlsmith, 1959). Although this particular interpretation seemed less plausible than the self-perception account based on additional data, both processes are relevant to situations in which the recipient's behavior contradicts an earlier persuasive message.

Reactions to perceived influence intent are in many ways similar to phenomena identified in the context of cognitive dissonance. In Festinger and Carlsmith's (1959) classic study, male participants worked for 1 hour on boring tasks such as turning spools on a board. Immediately after this task, participants were told that the experimenter was investigating the effects of expectancies on performance. They were further informed that they were in a control condition that did not receive any information before beginning the tasks. However, they learned that other participants were to receive information designed to create a positive expectation about the task. The positive expectations were ostensibly instilled by asking the participants to tell another student that the task was enjoyable. Importantly, participants were offered either



\$1 or \$20 for providing a positive evaluation of the task to the other participant (actually an experimenter's accomplice).

Results of how enjoyable the task was to the participants depended on the amount of money they received in exchange for lying. Participants who were paid \$1 for describing the experiment as enjoyable rated the tasks as more enjoyable than did participants who were paid \$20. Festinger and Carlsmith (1959) argued that participants, who lied experienced dissonance created by the cognitions "The tasks were boring" and "I told someone the tasks were enjoyable." Those who were paid \$20, however, had an important consonant cognition in "I was paid a lot of money to tell someone the tasks were enjoyable." This awareness of an environmental influence was sufficient to reduce the dissonance magnitude and the associated influence of the behavior on private reports.

Cognitive dissonance theorists gave arousal and perceived self-determination central roles in attitude change (Olson & Stone, 2005), and highlight how awareness of a reward's influence can increase the level of arousal associated with an object. In particular, arousal measured with skin conductance is greater when participants undergo typical dissonance manipulations and have no opportunity to reduce this dissonance (Croyle & Cooper, 1983; Elkin & Leippe, 1986). This finding has received repeated support (see Harmon-Jones, Brehm, Greenberg, Simon, & Nelson, 1996) and is generally taken as an indication that affective feelings are necessary for the experience and consequences of cognitive dissonance. Even more definitive, however, has been evidence from studies using *misattribution paradigms* (Zanna & Cooper, 1974). For example, in one study, participants engaged in belief-discrepant behavior, and for some, physiological measures of arousal were obtained (Croyle & Cooper, 1983). When physiological measures were obtained, participants' beliefs were not affected by their behavior, presumably because they attributed their experienced arousal to the elaborate measurement apparatus. In contrast, when no such measures were obtained, participants supposedly attributed their feelings to the behavior and changed their beliefs accordingly. Participants were either instructed to write a counterattitudinal essay (low choice) or politely asked to write a counterattitudinal essay (high choice). Also, all participants were given a placebo tablet. Some were informed that the pill would "produce a reaction of tenseness," others that the pill would "produce a reaction of relaxation," and others that the pill had no side effects (Zanna & Cooper, 1974, p. 705). Participants in the low-choice conditions showed minimal attitude change; for low-choice participants, writing the essay was not a counterattitudinal behavior because they were able to make an external attribution for their dissonant behavior (e.g., "the experiment required that I write that essay").

Participants in the high-choice conditions showed varying degrees of attitude change. Those in the "tenseness" condition showed minimal attitude change; they, too, were able to make an external attribution (to the placebo) for the physiological arousal induced by their dissonant behavior. Those in the "no side effect" condition showed moderate attitude change, consistent with other research on cognitive dissonance. Finally, those in the "relaxation" condition showed a great deal of attitude change; they "showed an increased need to deal with their arousal by changing their opinions" (Zanna & Cooper, 1974, p. 707).

### Communication Pragmatics

A final fascinating aspect of reactions to seemingly active environments entails the use of the actual content of a communication as a source of information about the influence source. In a study conducted by Rosen, Cochran, and Musser (1990), participants read recommendation letters about a job applicant, as well as the applicants' (positive) self-descriptions. These self-descriptions positively influenced impressions of the applicant only when the recommendation letters were favorable. In contrast, these descriptions negatively influenced these impressions when the recommendation letters were unfavorable. Presumably the self-descriptions were perceived as deceitful or manipulative when they contradicted other information about the source of these self-descriptions.

Wyer, Budesheim, and Lambert (1990) provided a systematic analysis of communication pragmatics. In this framework, people are supposed to spontaneously form impressions of communicators, even in the absence of instructions to do so. For this reason, the descriptions a speaker provides about another person often say more about the speaker than the target person. Disparaging others, for example, creates the impression that the speaker is intolerant and unfriendly. Interestingly, however, the content of a communication has different pragmatic implications depending on the source type. Gruenfeld and Wyer (1992) examined the influence of affirmations and denials in different communication contexts. In this work, message sources were manipulated to be either a newspaper or a volume that records archival knowledge. Both sources affirmed and denied propositions that participants would normally assume to be untrue (e.g., the presidential candidate did not have an affair). When the message source was a newspaper, affirming and denying statements were taken as informative, resulting in participants' beliefs in both the affirmed and denied reports ( $d$  for difference between affirmations and denials = .08). In contrast, when the ostensible source was an archive, only affirming statements informed beliefs ( $d$  for difference between affirmations and denials = 1.12). Presumably,



recipients believed newspapers to make statements for a reason but archives to provide redundant information. In this context, recipients believed that the newspaper denials were attempts to manipulate public opinion.

### Summary

A seemingly active environment can elicit attributions of influence intent and, therefore, self-defense (e.g., resistance and reactance theory). Many of these processes have been studied in prior decades and have also received research attention in recent years. Strong messages recommending a behavior have been recently shown to influence attitudes only in relation to the behavior of the recipient. The actual arguments of a persuasive message, which were traditionally conceptualized as mere information, are now known to provide pragmatic information as well. These and many more findings now provide a more complete picture of social influence and persuasion mechanisms that should continue to emerge in the next decade.

### SUMMARY

Psychologists have made considerable progress understanding environmental influences on attitudes and are now making strides toward understanding biological and genetic influences as well. This chapter summarizes some of the ways in which genes can influence general affectivity (i.e., neuroticism and impulsivity), and therefore attitude valence and related arousal, but most of this work remains to be done. This chapter also reviewed environmental influences, an area in which many important and influential findings have accrued for more than a century of attitude research. The last decade has been dedicated to elucidating some of the details of these processes but has been relatively silent about the larger connections between the processes triggered by seemingly passive environments and reactions to persuasive intent. We hope that future researchers will address these broad questions, as well as the vast set of questions related to gene-environment interactions. Both scholars and practitioners will benefit from continued progress in this classic yet vibrant inquiry domain.

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