Polanyi, L., and R. J. H. Scha. (1983). The syntax of discourse. *Text* 3: 261–270.

Schiffrin, D. (1987). *Discourse Markers.* Cambridge: Cambridge University Press.

Searle, J. R., F. Kiefer, and M. Bierwisch, Eds. (1980). *Speech Act Theory and Pragmatics.* Dordrecht: Reidel.

Dissonance

Festinger's (1957) theory of cognitive dissonance is, by far, the most prominent of several social-psychological theories based on the premise that people are motivated to seek consistency among their beliefs, attitudes, and actions (Abelson et al. 1968). It asserts that people find inconsistency, or "dissonance," among their cognitions to be emotionally aversive and seek to eliminate or reduce any inconsistency.

According to Festinger, cognitive dissonance is a tension state that arises whenever an individual simultaneously holds two or more cognitions that are mutually inconsistent with one another. In this model, any two cognitions, considered by themselves, stand in one of three relations to one another—dissonant (contradictory or inconsistent), consonant (consistent), or irrelevant. The total amount of dissonance for a given person in any particular situation is defined as the ratio of dissonant relations to total relevant relations, with each relation weighted for its importance to that person:

Total Dissonance = (Dissonant Relations) / (Dissonant + Constant Relations)

When cognitive dissonance arises, the individual is motivated to reduce the amount of dissonance. This can be done in many ways—by decreasing the number and/or the importance of dissonant relations, or by increasing the number and/or the importance of consonant relations. Precisely how dissonance is reduced in any particular situation depends on the resistance to change of the various cognitions involved. The resistance-to-change of any cognition in a particular context depends, in turn, on the extent to which a change would produce new dissonant relations, the degree to which the cognition is firmly anchored in reality, and the difficulty of changing those aspects of reality.

Consider a prototypic case: a cigarette smoker, circa 1960, encountering the first medical reports linking smoking to lung cancer, emphysema, and heart disease. His two cognitions, "I smoke," and, "Smoking causes serious diseases," are dissonant because both cognitions are of substantial importance to him and are inconsistent. To reduce this dissonance, he could quit smoking or, if this proved too difficult, could cut back on cigarettes or switch to a brand with lower tar and nicotine. Similarly, he could question the significance of "merely statistical" evidence regarding smoking and disease processes, downplay the relevance or importance of such evidence to his personal situation, avoid subsequent medical reports on the topic, and/or exaggerate the pleasures and positive consequences of smoking (e.g., how it helps him relax or control his weight).

Festinger (1957) used dissonance theory to account for a wide array of psychological phenomena, ranging from the transmission of rumors following disasters to the rationalization of everyday decisions, the consequences of counterattitudinal advocacy, selectivity in information search and interpretation, and responses to the disconfirmation of central beliefs. Of the many new research directions produced by the theory, three paradigms proved most influential.

The first major paradigm involved the attitudinal consequences of making a decision (Brehm 1956). Any choice among mutually exclusive options is postulated to produce dissonance, because any nonoverlapping bad features of the chosen alternative(s) or good features of the rejected alternative(s) are dissonant with the choice itself. To reduce this postdecisional dissonance, the individual is likely to exaggerate the advantages of the option(s) selected and to disparage the advantages of the option(s) rejected. Through this postdecisional reevaluation and "spreading apart" of the alternatives, individuals come to rationalize their decisions. Such effects appear most strongly when the decision is both difficult and irrevocable, and have proved to be highly replicable across a variety of decision contexts (Festinger 1964; Wicklund and Brehm 1976).

A second popular paradigm concerned the selectivity of information-seeking following a decision (Ehrlich et al. 1957). If the decision is difficult to undo (and not all of the attendant dissonance has already been reduced through reevaluation of the alternatives), the individual is motivated both to avoid subsequent information that seems likely to be dissonant with that decision and to seek out subsequent information that seems likely to support that decision. Empirical evidence concerning this aspect of the theory, however, has been much more mixed; and the precise conditions under which such selective exposure effects occur remain unclear (Freedman and Sears 1965; Frey 1986).

Finally, the third, and most influential paradigm examined the effects of "forced compliance," in which an individual is induced to engage in some counterattitudinal action with minimal, "psychologically insufficient," external coercion or incentive (e.g., Aronson and Carlsmith 1963; Festinger and Carlsmith 1959). In this case, dissonance derives from a conflict between the person's action and attitudes. To the extent that an overt action is harder to change than a personal opinion, attitudes are changed to conform more closely to behavior. The less the external pressure used to induce the behavior, the more such subsequent justification of one's actions occurs, because any external pressures provide added consonant relations. Such "insufficient justification" effects have been observed, under free-choice conditions, in a wide variety of situations, particularly when the person's counterattitudinal behavior has aversive consequences for which he/she feels personally responsible (Cooper and Fazio 1984; Harmon-Jones and Mills forthcoming; Lepper 1983).

More recent research on cognitive dissonance has emphasized three additional issues. Some authors have focused on the role of physiological arousal (e.g., Cooper and Fazio 1984) and psychological discomfort (e.g., Elliot and Devine 1994) in the production and reduction of cognitive dissonance, showing the importance of the motivational factors that distinguish dissonance theory from self-perception the-

ory (Bem 1967, 1972) and other nonmotivational alternative explanations. Others have emphasized the importance of the self-concept in cognitive dissonance, arguing that dissonance effects may depend on threats to one's self-concept and may be alleviated by procedures that affirm the SELF (e.g., Steele 1988; Thibodeau and Aronson 1992).

Most recently, computational models of dissonance reduction have sought to quantify dissonance more precisely and have simulated many of the subtleties of psychological findings (e.g., Read and Miller 1994; Shultz and Lepper 1996). These models use artificial NEURAL NETWORKS that treat dissonance reduction as a gradual process of satisfying constraints imposed on the relationships among beliefs by a motive for cognitive consistency. Their success suggests that dissonance, rather than being exotic and unique, may have much in common with other psychological phenomena (e.g., memory retrieval or analogical reasoning) that can also be understood in constraint-satisfaction terms.

The general success of dissonance theory—and the particular power of the "reevaluation of alternatives" and "insufficient justification" paradigms—seems to derive, in large part, from the breadth of the theory and from the ways that apparently "rational" consistency-seeking can, under certain conditions, produce unexpectedly "irrational" changes in actions and attitudes.

See also ATTRIBUTION THEORY; DECISION MAKING; MOTIVATION; MOTIVATION AND CULTURE; SOCIAL COGNITION

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References

Abelson, R. P., E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, and P. H. Tannenbaum, Eds. (1968). *Theories of Cognitive Consistency: A Sourcebook.* Chicago: Rand McNally.

Aronson, E. (1969). The theory of cognitive dissonance: A current perspective. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology*, vol. 4. New York: Academic Press, pp. 1–34.

Aronson, E., and J. M. Carlsmith. (1963). Effect of severity of threat on the devaluation of forbidden behavior. *Journal of Abnormal and Social Psychology* 66: 584–588.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review* 74: 183–200.

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology,* vol. 6. New York: Academic Press, pp. 1–62.

Brehm, J. W. (1956). Post-decision changes in the desirability of choice alternatives. *Journal of Abnormal and Social Psychology* 52: 384–389.

Cooper, J., and R. H. Fazio. (1984). A new look at dissonance theory. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology,* vol. 17. New York: Academic Press, pp. 229–266.

Ehrlich, D., I. Guttman, P. Schoenbach, and J. Mills. (1957). Post-decision exposure to relevant information. *Journal of Abnormal and Social Psychology* 54: 98–102.

Elliot, A. J., and P. G. Devine. (1994). On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort. *Journal of Personality and Social Psychology* 67: 382–394.

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Evanston, IL: Row, Peterson.

Festinger, L., Ed. (1964). *Conflict, Decision, and Dissonance.* Stanford, CA: Stanford University Press.

Festinger, L., and J. M. Carlsmith. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology* 58: 203–210.

Freedman, J. L., and D. O. Sears. (1965). Selective exposure. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology,* vol. 2. New York: Academic Press, pp. 57–97.

Frey, D. (1986). Recent research on selective exposure to information. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology,* vol. 19. New York: Academic Press, pp. 41–80.

Harmon-Jones, E. and J. Mills, Eds. (Forthcoming). *Dissonance theory: Twenty-five years later.* Washington, DC: American Psychological Association.

Lepper, M. R. (1983). Social-control processes and the internalization of values: An attributional perspective. In E. T. Higgins, D. N. Ruble, and W. W. Hartup, Eds., *Social Cognition and Social Development.* New York: Cambridge University Press, pp. 294–330.

Read, S. J., and L. C. Miller. (1994). Dissonance and balance in belief systems: The promise of parallel constraint satisfaction processes and connectionist modeling approaches. In R. C. Schank and E. Langer, Eds., *Beliefs, Reasoning, and Decision Making: Psycho-logic in Honor of Bob Abelson.* Hillsdale, NJ: Erlbaum, pp. 209–235.

Shultz, T. R., and M. R. Lepper. (1996). Cognitive dissonance reduction as constraint satisfaction. *Psychological Review* 103: 219–240.

Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz, Ed., *Advances in Experimental Social Psychology,* vol. 21. New York: Academic Press, pp. 261–302.

Thibodeau, R., and E. Aronson. (1992). Taking a closer look: Reasserting the role of the self-concept in dissonance theory. *Personality and Social Psychology Bulletin* 18: 591–602.

Wicklund, R. A., and J. Brehm. (1976). *Perspectives on Cognitive Dissonance.* Hillsdale, NJ: Erlbaum.

Distinctive Features

Every speech sound shares some articulatory and acoustic properties with other speech sounds. For example, the consonant [n] shares nasality with [m], complete oral closure with the set [pbmtdkg], and an elevated tongue-tip with the set [tdsz].

Most contemporary theories of PHONOLOGY posit a universal set of distinctive features to encode these shared properties in the representation of the speech sounds themselves. The hypothesis is that speech sounds are represented mentally by their values for binary distinctive features, and that a single set of about twenty such features suffices for all spoken languages. Thus, the distinctive features, rather than the sounds built from them, are the primitives of phonological description. The sound we write as [n] is actually a bundle of distinctive feature values, such as [+nasal], [–continuant] (complete oral closure), and [+coronal] (elevated tongue-tip).

Three principal arguments can be presented in support of this hypothesis:

1. The union of the sound systems of all spoken languages is a smaller set than the physical capabilities of the human vocal and auditory systems would lead one to