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An Action-Based Model of Cognitive-Dissonance Processes

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Abstract
The action-based model extends the original theory of cognitive dissonance by proposing *why* cognitive inconsistency causes both dissonance and dissonance reduction. The model begins by assuming that many perceptions and cognitions automatically impel us to act in specific ways. It then posits that the negative affective state of dissonance is aroused not by all cognitive conflict but, specifically, when cognitions with action implications are in conflict with each other, making it difficult to act. The dissonance signals to the organism that there is a problem and that the cognitive inconsistency needs to be resolved so that behavior can occur. After presenting the action-based model, we review results from behavioral and neuroscience experiments that have tested predictions derived from it.

Keywords
cognitive dissonance, approach motivation, attitudes, anterior cingulate cortex, asymmetrical frontal cortical activity

Cognitive dissonance theory (Festinger, 1957) continues to develop and inspire new research. Herein, we briefly review the original theory and recent theoretical developments focused on action. In reviewing these developments, we also review novel discoveries from a variety of perspectives in areas including motivation, emotion, personality, and cognitive and affective neuroscience.

The Original Theory of Cognitive Dissonance

Festinger's (1957) original theory of cognitive dissonance concerned situations in which individuals have two cognitions that are relevant to each other but inconsistent with each other. For the theory, cognitions were any bits of knowledge an individual may have. Cognitions could be relevant or irrelevant to one another. If they were relevant to one another, they could be consistent or inconsistent with each other. Festinger's classic example was of the inconsistent cognitions of a smoker who knew that smoking was unhealthy.

Having relevant and inconsistent cognitions creates psychological discomfort, or *dissonance*. The amount of dissonance depends on the importance of the cognitions and whether the other cognitions the person holds are consistent or inconsistent with a particular cognition, referred to as the *generative cognition* (Beauvois & Joule, 1996). The generative cognition is the one the person holds that is most resistant to being changed; it is often a cognition about one's behavior, as behavior is difficult to undo, but it could also be an attitude or future commitment. The magnitude of dissonance is equal to D / D + C, where D is the sum of cognitions dissonant with the generative cognition and C is the sum of cognitions consonant with the generative cognition, with each cognition weighted for importance. Festinger (1957) posited that dissonance motivates psychological work to reduce the inconsistency.

A dieter who just consumed a fattening meal would likely experience dissonance. Because it would be difficult to undo the consumption of the meal, the knowledge that he ate the meal would be the generative cognition. The theory predicts that he could reduce dissonance by adding consonant cognitions ("This meal was fantastic!"), subtracting dissonant cognitions ("I don't need to be on a diet"), increasing the importance of consonant cognitions ("We only live once, so we should

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enjoy fantastic food!"), or decreasing the importance of dissonant cognitions ("Dieting is unimportant").

The majority of tests of the theory have used one of three procedures. In the *induced-compliance paradigm*, individuals are given a perception of having low choice or high choice to engage in an action that is counter to an attitude they hold. Individuals who engage in the action with high choice have little justification for doing so (few consonant cognitions), and consequently they experience dissonance. To reduce dissonance, they change their attitudes to be more in line with their behavior (Festinger & Carlsmith, 1959).

In the *free-choice* or *difficult-decision paradigm*, individuals decide between two different options that are either far apart (easy decision) or close (difficult decision) in perceived desirability. Dissonance occurs following the decision because the positive characteristics of the rejected option and the negative characteristics of the chosen option are inconsistent with the decision. Individuals reduce dissonance by evaluating the chosen option more favorably and the rejected alternative more negatively than they did prior to the decision (when the options were viewed as almost equally favorable). They thus *spread the alternatives* apart (Brehm, 1956).

In the *effort-justification paradigm*, individuals engage in effortful behavior to achieve a goal. Dissonance results from the inconsistency between the unpleasant effort an individual exerts and the desire not to exert effort. To reduce this dissonance, individuals evaluate the reason for engaging in the effortful action more positively (Aronson & Mills, 1959).

Alternative Theoretical Explanations

Soon after the publication of the original version of the theory, scientists proposed alternative theoretical explanations. These theories changed the focus from inconsistency to concerns about violating the self-concept or harming others (for review, see E. Harmon-Jones & Mills, 1999). However, more recent research revealed that although self-concept threats increase dissonance, they are not necessary to cause dissonance (E. Harmon-Jones, 2000). For instance, rats (Lawrence & Festinger, 1962) and capuchin monkeys (Egan, Santos, & Bloom, 2007), which are believed to lack the complex self-concepts required by these models, engage in dissonance reduction.

Nevertheless, questions about the basic mechanism underlying dissonance effects remained: Why does cognitive inconsistency evoke a negative emotive state? Why does this state motivate cognitive changes? Festinger (1957) did not address these questions, but the action-based model of dissonance does (E. Harmon-Jones, Amodio, & Harmon-Jones, 2009).

The Action-Based Model of Dissonance: Why Do Dissonance Processes Occur?

Consistent with other perspectives (Gibson, 1966; James, 1890/1950; Smith & Semin, 2004), the action-based model begins by assuming that many perceptions and cognitions automatically impel us to act in specific ways. The action-based model then suggests that the negative affective state of dissonance is aroused not by all cognitive conflict but, specifically, when cognitions with *action implications* conflict with each other, making it difficult to act. The model presumes that cognition is for behavior—that is, the most important purpose of cognition is to guide behavior. If an organism is unable to behave, it generally does not require cognition (e.g., plants lack cognition). Any cognition has the potential to influence action to some degree. However, some cognitions have more immediate, clear, and insistent action implications than others, and these cognitions would be expected to produce greater dissonance in the face of inconsistency (i.e., these action cognitions are likely more important in the moment). The dissonance signals to the organism that there is a problem and that the cognitive inconsistency needs to be resolved so that behavior can occur.

Most situations that cause dissonance involve difficult decisions and a commitment to action. According to the action-based model, once individuals commit to a course of action, they are primed to act. That is, they are motivated to translate their intended behavior into effective action, and this approach motivation is revealed in changes in attitudes that support the commitment. These attitudinal changes help us to follow through, to effectively enact the behaviors that follow from the decision.

Consider an individual who has just made the difficult decision of starting yoga. The benefits of yoga, such as increased flexibility and decreased stress, are consonant cognitions. The drawbacks of yoga, such as the expense and muscle soreness, are dissonant cognitions. The unpleasantness of dissonance motivates the individual to decrease the cognitive discrepancy. The more the individual can reduce the number and importance of dissonant cognitions and increase the number and importance of consonant cognitions, the more likely it is that she will stick with yoga and reap its benefits. According to the action-based model, the discrepancy between action tendencies is vitally important. Cognitions consonant with the decision will impel one to perform yoga, whereas cognitions dissonant from the decision will have the opposite effect. Reducing the discrepancy not only reduces the negative feeling of dissonance, it impels individuals to follow through with their decisions.

Testing the Action-Based Model

Action orientation and spreading of alternatives

According to the action-based model, after making decisions, individuals are in a mind-set of "getting things done" (Kuhl, 1984). This mind-set motivationally tunes one toward enacting the decision and behaving effectively with regard to it. This approach-motivated state, which has been referred to as an implemental or action-oriented mind-set (Gollwitzer & Bayer, 1999), increases decision implementation and goal accomplishment (Gollwitzer & Sheeran, 2006).

According to the action-based model, an action-oriented state should increase cognitive-discrepancy reduction. Following this logic, experiments have manipulated whether participants were in an action-oriented state following a difficult decision. In one experiment (E. Harmon-Jones & Harmon-Jones, 2002), individuals made a difficult decision about which type of experiment they would perform. Then, an action-orientated state was increased by having individuals think about an important, unrelated goal and describe their plan to accomplish this goal. Results indicated that individuals in this action-orientation condition demonstrated more spreading of alternatives than did individuals in comparison conditions.

Embodied manipulation of approach motivation and discrepancy reduction

Approach motivation, or the urge to go toward (E. Harmon-Jones, Harmon-Jones, & Price, 2013), can be influenced by simple manipulations, such as whole-body-posture manipulations. Relative to leaning forward and sitting upright, when individuals are lying flat on their backs (i.e., supine), they respond with less approach motivation toward photographs of desirable stimuli such as desserts and attractive individuals (E. Harmon-Jones, Gable, & Price, 2011; Price, Dieckman, & Harmon-Jones, 2012). The action-based model predicts that if a supine posture decreases approach motivation, it should also decrease cognitive-discrepancy reduction.

This prediction was tested in two experiments, using the difficult-decision paradigm and the effort-justification paradigm, respectively. In the difficult-decision experiment, individuals who sat upright showed the typical spreading-of-alternatives effect, but this effect was decreased when participants were in a supine posture. In the effort-justification experiment, individuals who sat upright justified their effort by rating the goal as more positive, whereas those who reclined in a supine posture did not (E. Harmon-Jones, Price, & Harmon-Jones, 2015).

Trait approach motivation and discrepancy reduction

Correlational studies have found that individuals who score high in trait approach motivation show more discrepancy reduction following commitments to difficult decisions and counterattitudinal behaviors (C. Harmon-Jones, Schmeichel, Inzlicht, & Harmon-Jones, 2011). In two studies (C. Harmon-Jones, Schmeichel, et al., 2011), individual differences in approach motivation were measured using a questionnaire (Carver & White, 1994). In the first study, participants made a difficult decision. As predicted, individuals who scored higher in trait approach motivation demonstrated more spreading of alternatives. In the second study, individuals who scored higher in trait approach motivation had more positive attitudes following induced compliance in the high-choice (but not the low-choice) condition. Like the experimental research described above, this supports the action-based model's hypothesis that discrepancy reduction is an approach-motivated process.

Neural activity involved in dissonance processes

Dissonance arousal, conflict monitoring, and the anterior cingulate cortex. According to the action-based model, dissonance is aroused by the activation of cognitions that interfere with goal-driven behavior. Several experiments have found that individuals show increased anterior cingulate cortex (ACC) activity during simple cognitive tasks that cause conflicts between behaviors, such as when you have to say the printed color of the word *green* when it is printed in red. It has been suggested that the ACC monitors action tendencies for potential conflicts so that other brain mechanisms can override the unwanted tendency and cause the intended response (Botvinick, Barch, Braver, Carter, & Cohen, 2001). These simple conflicts that activate the ACC are associated with negative affect (Hajcak & Foti, 2008).

The conflict-monitoring account is consistent with the action-based model, which focuses on conflicts between action tendencies. Research has revealed that when individuals who score low in racial prejudice accidentally make responses that suggest they are racists, more ACC activation occurs (Amodio et al., 2004). This activation was particularly evident for individuals with strong personal motivations to respond without prejudice (Amodio, Devine, & Harmon-Jones, 2008). Thus, when participants made responses that were dissonant with their attitude-based intentions, ACC activity was increased. These studies suggest that the ACC, and its associated conflict-monitoring function, is involved in dissonance

arousal. Other experiments have used more typical dissonance paradigms, including the induced-compliance and difficult-decision paradigms, and found increased ACC activity during dissonance (Izuma et al., 2010; Van Veen, Krug, Schooler, & Carter, 2009).

Dissonance reduction and the prefrontal cortex. The action-based model predicts that discrepancy reduction involves approach motivation, which works to implement the decision/commitment. Models of cognitive control predict that the prefrontal cortex is involved in amplifying the intended response over the unintended response tendency (Kerns et al., 2004). Whereas the ACC is associated with dissonance arousal, the prefrontal cortex is associated with discrepancy reduction.

Much evidence suggests that the left prefrontal region is involved in approach-motivational processes (E. Harmon-Jones, Gable, & Peterson, 2010) and thus in the implementation of intended actions. The action-based model predicts that commitment to a chosen course of action should lead to increased left prefrontal cortical activity, which should be associated with discrepancy reduction in support of the chosen course of action.

Three electroencephalography (EEG) experiments have tested this prediction in an induced-compliance paradigm (E. Harmon-Jones, Gerdjikov, & Harmon-Jones, 2008; E. Harmon-Jones, Harmon-Jones, Serra, & Gable, 2011). Results revealed that participants in the high-choice condition evidenced greater relative left frontal activation than individuals in the low-choice condition.

Subsequent experiments have manipulated this presumed mediator, relative left prefrontal cortical activity, and found it to causally influence dissonance-related attitude change. One experiment used neurofeedback (E. Harmon-Jones, Harmon-Jones, Fearn, Sigelman, & Johnson, 2008) and another used transcranial direct current stimulation to decrease left dorsolateral frontal cortical activity (Mengarelli, Spoglianti, Avenanti, & di Pellegrino, 2013). Also, a functional MRI (fMRI) study found that greater spreading of alternatives after difficult decisions was predicted by post-decision activity in the left lateral prefrontal cortex (Qin et al., 2011). Another experiment manipulated the action-oriented state following a difficult decision (E. Harmon-Jones, Harmon-Jones, et al., 2008, Experiment 2) and found that the action-oriented state increased relative left prefrontal cortical activity and spreading of alternatives.

Other fMRI studies have found that ventral striatal activity during difficult decisions predicts spreading of alternatives (Jarcho, Berkman, & Lieberman, 2011; Kitayama, Chua, Tompson, & Han, 2013). These results also suggest that approach motivation, which is associated with activation of the ventral striatum, increases dissonance-related attitude change.

Conclusion

The action-based model provides an explanation of the motivation underlying dissonance processes. This model assumes that, in most cases, dissonance processes primarily function to facilitate effective action. Organisms experience psychological discomfort when they have inconsistent cognitions because these cognitions impede effective action.

The majority of dissonance research has considered situations involving inconsistencies that clearly pertain to behavior. Dissonance also results from inconsistencies between perceptions or values (Proulx, Inzlicht, & Harmon-Jones, 2012). The model posits that these cognitions often have urgent, immediate action implications. For example, an illusion that causes one to perceive the depth of a cliff as less than it really is could cause injury if one were to try to walk across it. Similarly, it may be adaptive to experience dissonance upon seeing an unrealistically attractive picture of oneself: If one were to accept the incorrect feedback about one's attractiveness as valid, one might approach unfeasibly attractive members of the opposite sex and be rejected.

This way of thinking about dissonance processes has already stimulated research on dissonance theory, and it connects dissonance theory and its evidence with other research concerning motivation, emotion, cognitive conflict, self-regulation, defensive reactions to threat, and cognitive and affective neuroscience (e.g., Jonas et al., 2014).

Recommended Reading

Beauvois, J. L., & Joule, R. V. (1996). (See References). An important treatise that precisely explains the elements of dissonance theory.

Harmon-Jones, E., Amodio, D. M., & Harmon-Jones, C. (2009). (See References). An introduction to the action-based model of dissonance theory.

Mengarelli, F., Spoglianti, S., Avenanti, A., & di Pellegrino, G. (2013). (See References). An experiment showing how brain-stimulation methods can be used to test predictions derived from dissonance theory.

Van Veen, V., Krug, M. K., Schooler, J. W., & Carter, C. S. (2009). (See References). An experiment providing fMRI evidence of dorsal anterior cingulate cortex activation during dissonance arousal.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

References

Amodio, D. M., Devine, P. G., & Harmon-Jones, E. (2008). Individual differences in the regulation of intergroup bias: The role of conflict monitoring and neural signals for control. *Journal of Personality and Social Psychology*, *94*, 60–74.

Amodio, D. M., Harmon-Jones, E., Devine, P. G., Curtin, J. J., Hartley, S., & Covert, A. (2004). Neural signals for the detection of unintentional race bias. *Psychological Science*, *15*, 88–93.

Aronson, E., & Mills, J. (1959). The effect of severity of initiation on liking for a group. *Journal of Abnormal and Social Psychology*, *59*, 177–181. doi:10.1037/h0047195

Beauvois, J. L., & Joule, R. V. (1996). *A radical dissonance theory*. London, England: Taylor & Francis.

Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., & Cohen, J. D. (2001). Conflict monitoring and cognitive control. *Psychological Review*, *108*, 624–652.

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

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*, 319–333.

Egan, L. C., Santos, L. R., & Bloom, P. (2007). The origins of cognitive dissonance: Evidence from children and monkeys. *Psychological Science*, *18*, 978–983.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

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

Gibson, J. J. (1966). *The senses considered as perceptual systems*. Boston, MA: Houghton Mifflin.

Gollwitzer, P. M., & Bayer, U. (1999). Deliberative versus implemental mindsets in the control of action. In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 403–422). New York, NY: Guilford.

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 38, pp. 69–119). San Diego, CA: Elsevier Academic Press.

Hajcak, G., & Foti, D. (2008). Errors are aversive: Defensive motivation and the error-related negativity. *Psychological Science*, *19*, 103–108.

Harmon-Jones, C., Schmeichel, B. J., Inzlicht, M., & Harmon-Jones, E. (2011). Trait approach motivation relates to dissonance reduction. *Social Psychological & Personality Science*, *2*, 21–28.

Harmon-Jones, E. (2000). An update on dissonance theory, with a focus on the self. In A. Tesser, R. Felson, & J. Suls (Eds.), *Psychological perspectives on self and identity* (pp. 119–144). Washington, DC: American Psychological Association.

Harmon-Jones, E., Amodio, D. M., & Harmon-Jones, C. (2009). Action-based model of dissonance: A review, integration, and expansion of conceptions of cognitive conflict. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 41, pp. 119–166). San Diego, CA: Academic Press.

Harmon-Jones, E., Gable, P. A., & Peterson, C. K. (2010). The role of asymmetric frontal cortical activity in emotion-related phenomena: A review and update. *Biological Psychology*, *84*, 451–462. doi:10.1016/j.biopsycho.2009.08.010

Harmon-Jones, E., Gable, P. A., & Price, T. F. (2011). Leaning embodies desire: Evidence that leaning forward increases relative left frontal cortical activation to appetitive stimuli. *Biological Psychology*, *87*, 311–313.

Harmon-Jones, E., Gerdjikov, T., & Harmon-Jones, C. (2008). The effect of induced compliance on relative left frontal cortical activity: A test of the action-based model of dissonance. *European Journal of Social Psychology*, *38*, 35–45.

Harmon-Jones, E., & Harmon-Jones, C. (2002). Testing the action-based model of cognitive dissonance: The effect of action-orientation on post-decisional attitudes. *Personality and Social Psychology Bulletin*, *28*, 711–723.

Harmon-Jones, E., Harmon-Jones, C., Fearn, M., Sigelman, J. D., & Johnson, P. (2008). Action orientation, relative left frontal cortical activation, and spreading of alternatives: A test of the action-based model of dissonance. *Journal of Personality and Social Psychology*, *94*, 1–15.

Harmon-Jones, E., Harmon-Jones, C., & Price, T. F. (2013). What is approach motivation? *Emotion Review*, *5*, 291–295. doi:10.1177/1754073913477509

Harmon-Jones, E., Harmon-Jones, C., Serra, R., & Gable, P. A. (2011). The effect of commitment on relative left frontal cortical activity: Tests of the action-based model of dissonance. *Personality and Social Psychology Bulletin*, *37*, 395–408.

Harmon-Jones, E., & Mills, J. (1999). *Cognitive dissonance: Progress on a pivotal theory in social psychology*. Washington, DC: American Psychological Association.

Harmon-Jones, E., Price, T. F., & Harmon-Jones, C. (2015). Supine body posture decreases rationalizations: Testing the action-based model of dissonance. *Journal of Experimental Social Psychology*, *56*, 228–234.

Izuma, K., Matsumoto, M., Murayama, K., Samejima, K., Sadato, N., & Matsumoto, K. (2010). Neural correlates of cognitive dissonance and choice-induced preference change. *Proceedings of the National Academy of Sciences, USA*, *107*, 22014–22019.

James, W. (1950). *The principles of psychology*. New York, NY: Dover. (Original work published 1890)

Jarcho, J. M., Berkman, E. T., & Lieberman, M. D. (2011). The neural basis of rationalization: Cognitive dissonance reduction during decision-making. *Social Cognitive and Affective Neuroscience*, *6*, 460–467. doi:10.1093/scan/nsq054

Jonas, E., McGregor, I., Klackl, J., Agroskin, D., Fritsche, I., Holbrook, C., . . . Quirin, M. (2014). Threat and defense: From anxiety to approach. In M. P. Zanna & J. M. Olson (Eds.), *Advances in experimental social psychology* (Vol. 49, pp. 219–286). San Diego, CA: Elsevier.

Kerns, J. G., Cohen, J. D., MacDonald, A. W., Cho, R. Y., Stenger, V. A., & Carter, C. S. (2004, February 13). Anterior cingulate conflict monitoring and adjustments in control. *Science*, *303*, 1023–1026.

Kitayama, S., Chua, H. F., Tompson, S., & Han, S. (2013). Neural mechanisms of dissonance: An fMRI investigation of choice justification. *NeuroImage*, *69*, 206–212. doi:10.1016/j.neuroimage.2012.11.034

Kuhl, J. (1984). Volitional aspects of achievement motivation and learned helplessness: Toward a comprehensive theory of action-control. In B. A. Maher (Ed.), *Progress in*

experimental personality research (Vol. 13, pp. 99–171). New York, NY: Academic Press.

Lawrence, D. H., & Festinger, L. (1962). *Deterrents and reinforcement*. Stanford, CA: Stanford University Press.

Mengarelli, F., Spoglianti, S., Avenanti, A., & di Pellegrino, G. (2013). Cathodal tDCS over the left prefrontal cortex diminishes choice-induced preference change. *Cerebral Cortex*. Advance online publication. doi:10.1093/cercor/bht314

Price, T. F., Dieckman, L., & Harmon-Jones, E. (2012). Embodying approach motivation: Body posture influences startle eyeblink and event-related potential responses to appetitive stimuli. *Biological Psychology*, *90*, 211–217. doi:10.1016/j.biopsycho.2012.04.001

Proulx, T., Inzlicht, M., & Harmon-Jones, E. (2012). Understanding all inconsistency compensation as a palliative response to violated expectations. *Trends in Cognitive Sciences*, *16*, 285–291. doi:10.1016/j.tics.2012.04.002

Qin, J., Kimel, S., Kitayama, S., Wang, X., Yang, X., & Han, S. (2011). How choice modifies preference: Neural correlates of choice justification. *NeuroImage*, *55*, 240–246.

Smith, E. R., & Semin, G. R. (2004). Socially situated cognition: Cognition in its social context. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 36, pp. 53–117). San Diego, CA: Academic Press.

Van Veen, V., Krug, M. K., Schooler, J. W., & Carter, C. S. (2009). Neural activity predicts attitude change in cognitive dissonance. *Nature Neuroscience*, *12*, 1469–1474.