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The Origins of Cognitive Dissonance : Evidence From Children and Monkeys

Research Article

The Origins of Cognitive Dissonance

Evidence From Children and Monkeys

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ABSTRACT—*In a study exploring the origins of cognitive dissonance, preschoolers and capuchins were given a choice between two equally preferred alternatives (two different stickers and two differently colored M&M's®, respectively). On the basis of previous research with adults, this choice was thought to cause dissonance because it conflicted with subjects' belief that the two options were equally valuable. We therefore expected subjects to change their attitude toward the unchosen alternative, deeming it less valuable. We then presented subjects with a choice between the unchosen option and an option that was originally as attractive as both options in the first choice. Both groups preferred the novel over the unchosen option in this experimental condition, but not in a control condition in which they did not take part in the first decision. These results provide the first evidence of decision rationalization in children and nonhuman primates. They suggest that the mechanisms underlying cognitive-dissonance reduction in human adults may have originated both developmentally and evolutionarily earlier than previously thought.*

Cognitive dissonance is one of the most heavily studied phenomena in the history of psychology. The term *cognitive dissonance* describes a psychological state in which an individual's cognitions—beliefs, attitudes, and behaviors—are at odds (Festinger, 1957). People experience cognitive dissonance as aversive (Elliot & Devine, 1994), and are motivated to resolve the inconsistency between their discrepant cognitions. Psychologists have long been interested in the nature of cognitive dissonance, as this phenomenon has implications for many areas of psychology, including attitudes and prejudice (e.g., Leippe & Eisenstadt, 1994), moral cognition (e.g., Tsang, 2002), decision making (e.g., Akerlof & Dickens, 1982), happiness (e.g., Lyubomirsky & Ross, 1999), and therapy (Axsom, 1989).

Unfortunately, despite long-standing interest in cognitive dissonance, there is still little understanding of its origins—both developmentally over the life course and evolutionarily as the product of human phylogenetic history. Does cognitive-dissonance reduction begin to take hold only after much experience with the aversive consequences of dissonant cognitions, or does it begin earlier in development? Similarly, are humans unique in their drive to avoid dissonant cognitions, or is this process older evolutionarily, perhaps shared with nonhuman primate species?

To date, little research has investigated whether children or nonhuman primates experience and strive to reduce dissonance. In one welcome exception in the developmental literature, Aronson and Carlsmith (1963) found that 4-year-old children who obeyed an experimenter's mild warning not to play with an attractive toy later liked the toy less than did children who had obeyed an experimenter's severe warning not to play with the toy. Aronson and Carlsmith interpreted this result in terms of cognitive dissonance: Because children seek to make their attitudes consistent with their behaviors, when they followed the warning and avoided the toy, their liking for the toy decreased. This effect, however, relied on an induced behavior—obedience to an adult's admonition—rather than on more self-driven decisions on the part of the children. We believe that a demonstration that children shift their attitudes because of counterattitudinal self-driven behavior would provide clearer evidence that they are motivated to resolve cognitive dissonance in their everyday lives.

There is also relatively limited work on cognitive-dissonance reduction in other species, despite the fact that Festinger himself wondered about the extent to which animals experience dissonance. Indeed, Lawrence and Festinger (1962) postulated that cognitive dissonance could explain patterns of extinction

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across different reward conditions. In line with this suggestion, work on cognitive dissonance in nonhuman animals has exclusively employed variants of the effort-justification paradigm (see Aronson & Mills, 1959, for a version of this paradigm with human subjects). This research has led to mixed results. Lewis (1964), for example, demonstrated that rats who pulled a weight harder to obtain a food pellet ran faster to retrieve the pellet after the work was completed. Although Lewis explained these results in terms of cognitive dissonance, other researchers have argued that they could have been due to a simple transfer-of-effort effect: A rat who has just pulled a heavy weight may run faster than a rat who has pulled a light weight because it is physiologically aroused, not necessarily because it experiences greater anticipation of the reward (see Armus, 2001). In a study supporting this view, Armus (2001) observed no differential preferences for food pellets when one food was given in response to much work and another was given in response to limited work. This negative result suggests that rats may not strive to reduce cognitive dissonance, at least in the context of effort justification.

Other nonhuman species—particularly birds—have demonstrated effects similar to dissonance reduction in the context of effort-justification paradigms (*Stumus vulgaris*: Kacelnik & Marsh, 2002; *Columba livia*: Clement, Feltus, Kaiser, & Zentall, 2000; DiGian, Friedrich, & Zentall, 2004; Friedrich, Clement, & Zentall, 2004). Friedrich and Zentall (2004), for example, demonstrated that pigeons prefer to eat from a feeder that is associated with greater rather than lesser effort. The authors explained these results in terms of relative contrast effects: Pigeons who receive a piece of food after pecking many times experience a larger shift in relative hedonic status than those who simply receive a piece of food after pecking once (Friedrich & Zentall, 2004). Thus, the results of effort-justification studies of animals may be attributed to changes in the relative hedonic value of the reward, rather than changes to the animals' attitudes per se.[1]

In the study reported here, we used a combined comparative-developmental approach to investigate both the developmental and the evolutionary origins of cognitive-dissonance reduction (see Hauser & Spelke, 2004). More specifically, we tested two populations—human children and nonhuman primates—on similar tasks to address the questions of how adult mechanisms for cognitive-dissonance reduction originate and when these mechanisms originated phylogenetically. This type of combined comparative-developmental approach has been used to investigate questions of origins in numerous domains of psychological inquiry, such as theory of mind (Tomasello, Call, & Hare, 2003; Tomasello, Carpenter, Call, Behne, & Moll, 2005), numerical cognition (Feigenson, Dehaene, & Spelke, 2004), and core physics knowledge (Hauser & Spelke, 2004; Spelke, 2000). In the present study, our goal was to examine whether children and nonhuman primates, like human adults, would shift their attitudes to fall in line with their decisions.

We hoped to develop a method that not only could be used with both children and monkeys, but also would provide an especially simple and direct test of cognitive-dissonance reduction—a test in which changes in behavior could clearly be attributed to attitude change per se, rather than alternative phenomena. To do this, we modified the free-choice paradigm pioneered by Brehm (1956). In the traditional free-choice paradigm, individuals rate the attractiveness of a variety of items. They are then given a choice between two items that they have rated as equally attractive. This choice is thought to induce dissonance because a decision to avoid the unchosen alternative conflicts with the many positive, preferred aspects of that alternative. After making the choice, subjects are asked to rerate all items. Typically, subjects will rerate items that they have chosen as more attractive, and items that they did not choose as less attractive, apparently changing their attitudes to fit with their choices. This rating pattern suggests that subjects change their present attitudes to be in line with their past decisions.

Adapting this free-choice methodology for use with nonverbal populations, we first assessed individuals' preferences for similar objects and determined three (A, B, and C) that were equally attractive. Next, subjects received a choice between A and B (Phase 1) and then a second choice between whatever they did not select (either A or B) and C (Phase 2). We predicted that if subjects experienced dissonance in choosing one equally preferred item over the other, then they would change their attitude toward the unchosen item, liking it less because of their decision. Therefore, in Phase 2, when they had a choice between it and another (originally equally preferred) option, they would choose the unchosen item less. Subjects also participated in a control condition in which we removed the intentional-choice phase: Rather than choose intentionally between A and B in Phase 1, subjects simply received one of the two alternatives from the experimenter. In this condition, subjects were not expected to experience dissonance—as they themselves never made a choice between the two items—and therefore were not expected to show a preference in Phase 2.

METHOD

Child Study

Subjects
Thirty 4-year-olds ($M = 53.8$ months, $SD = 2.45$; 14 girls, 16 boys) participated in this study. Four other children began the study but did not complete it because of inability to understand the procedure or fatigue during testing. Children were recruited from a database of potential child subjects and from preschools and day-care centers in the New Haven, Connecticut, area. They were tested in the laboratory or in their preschools while seated on a carpeted floor across from the experimenter.

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[1] Friedrich and Zentall (2004) noted that this same hedonic-contrast effect may more parsimoniously explain human effort-justification effects as well.

Procedure

The experimenter assessed children's preferences for different stickers using a smiley-face rating scale that included six faces, corresponding to six levels of liking (see Fig. 1). We used commercially available adhesive foam stickers of various shapes (e.g., dolphin, dragonfly, ladybug). Stickers are often used in preschools as rewards for good behavior, and the children were enthusiastic about playing with the stickers. The experimenter first familiarized the children with the rating scale, explaining that the face with the large smile corresponded to great liking, the face with a straight line for a mouth corresponded to no liking, and the intermediate faces corresponded to liking that increased as the degree of smile increased. Children's comprehension of the scale was confirmed by appropriate responses to the experimenter's three queries: "Let's say I like a sticker a whole lot/not very much at all/somewhere in the middle. Which face should I put it with?" Two children from the original sample were replaced because they had difficulty understanding the rating scale, as indicated by repeated failures to match stickers to appropriate faces.

After the children demonstrated their understanding of the scale, they were asked to match a series of stickers to the faces on it. They continued performing these ratings until they appeared to become fatigued. Each child included in the sample rated stickers until the experimenter was able to identify at least two triads of stickers for which the child had equal liking (i.e., stickers the child had matched to the same face on the scale). Two children from the original sample became fatigued before two full triads could be identified, and were replaced.

Once a child had rated the stickers, the experimenter randomly labeled the stickers in each triad as A, B, and C. The child was then given choices involving each triad of stickers. Each child participated in one of two conditions, either the *choice* condition or the *no-choice* condition. In the choice condition, the child was given one choice between A and B. The experimenter displayed A in one hand and B in the other and said, "Now, you get to choose a sticker to take home." Next, the child was given a similar choice between the unchosen alternative (i.e., either A or B, depending on which option the child had chosen) and C (i.e., the novel yet equally preferred alternative). The experimenter continued with other triads of stickers until all available triads were exhausted.

In the no-choice condition, each child received either A or B. The experimenter displayed A and B as in the choice condition and said, "Now, I'm going to give you a sticker to take home." The experimenter then randomly gave the child one of the two stickers. After receiving this sticker, the child was given a choice between the unreceived alternative (again, either A or B, depending on which one the experimenter had just given the child) and the equally preferred alternative, C.

At least two triads were used with each child, and the data were averaged across trials for each child.

Capuchin Study

Subjects

We tested 6 capuchins (*Cebus apella*) from the Comparative Cognition Laboratory at Yale University. This group included 4 adults and 2 adolescents. The monkeys were tested using M&M® candies as stimuli.
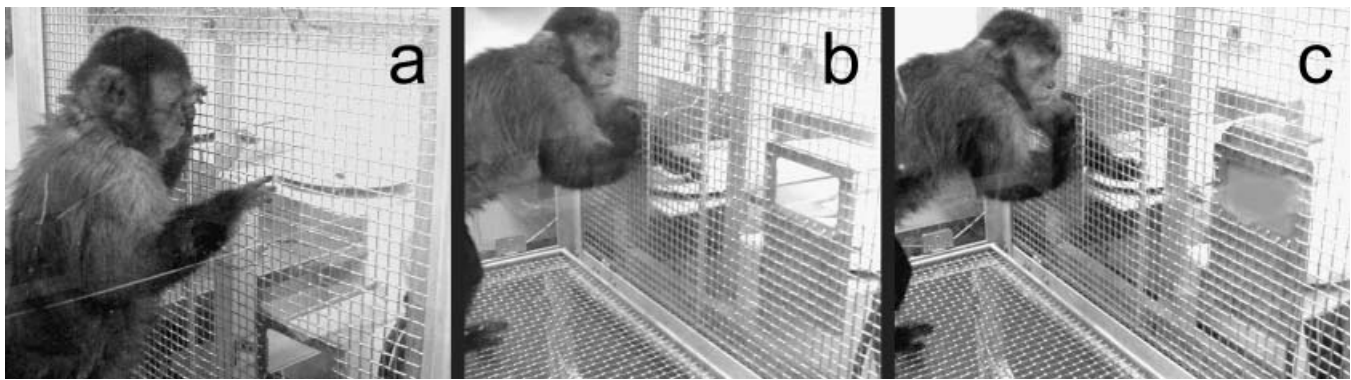
Procedure

We first assessed the monkeys' existing preferences for M&M's of different colors by timing how long they took to retrieve individual M&M's. For each monkey, preferences for at least nine different M&M colors were assessed. As each preference test began, the monkey was inside its home cage, just outside a testing chamber, and was allowed to watch as the experimenter placed one colored M&M on a tray outside the other side of the chamber. The door to the testing chamber was opened, and the monkey was allowed to enter when it wished to retrieve the M&M. We measured how quickly the monkey entered the testing chamber to retrieve the M&M. Preferences for each color were assessed across 20 trials per monkey; trials for each color spanned two experimental sessions.

After preference testing, we performed analyses of variance to determine whether each monkey had statistically significant preferences. We identified triads of equally preferred colors (all $ps > .05$), and designated the items within each triad as choices A, B, and C (choices were specific to each individual monkey); although there were no significant differences in preferences across the three M&M colors within a triad, we conservatively used each subject's least preferred color of the three (i.e., the one the monkey took longest to obtain during preference testing) as option C.

Each monkey was given four tests conceptually similar to those presented to the children. The monkeys were tested inside a familiar testing enclosure (82.5 cm × 82.5 cm × 82.5 cm) that had one wall with two openings (5 cm high × 9 cm long) spaced such that the subjects could not reach through both of the openings at the same time (see Fig. 2). Each monkey received one choice session followed by a no-choice session, and then either a second choice session followed by a second no-choice session or a second no-choice session followed by a choice session (counterbalanced across monkeys). Each session consisted of 1 choice trial (Phase 1) and 10 test trials (Phase 2).

A given monkey's first two sessions involved the same triad of M&M colors; that is, a monkey that liked red, blue, and yellow equally was tested using that triad of colors in both the choice and the no-choice conditions. The first choice and no-choice test

Fig. 1. Schematic of the smiley-face rating scale used with child subjects to assess their liking for stickers.

Fig. 2. The experimental setup used with capuchin subjects. First (a), the tray was presented outside the monkey's reach so that it could see the two options, but not reach them. The tray was then lowered, and the monkey either (b) was allowed to make a choice between the options (choice condition) or (c) could not obtain one of the foods (because one of the openings was closed) and therefore was not given a choice between them (no-choice condition).

sessions were separated by 2 months. The received alternative in this first no-choice session was whichever color the monkey had originally selected in the choice session. Two different triads of M&M colors were used for the third and fourth sessions. In the second no-choice session, the unreceived M&M color was chosen at random, but was never the M&M color that the subject least preferred within the triad because, as noted, we conservatively reserved the M&M color that was least preferred within the triad for use as option C. We emphasize, though, that although the monkeys took longest to obtain option C during preference testing, A and B were not significantly preferred over C.

In the choice condition, each monkey was initially presented with a choice trial involving a decision between two M&M colors (A and B). At the beginning of this trial (see Fig. 2a), M&M's A and B were presented on a tray that was outside the testing chamber and just beyond the monkey's reach. The experimenter placed the tray such that the monkey was able to see the two M&M's on the tray, but could not access them. After the monkey saw both items, the experimenter lowered the tray so that the monkey could choose one but not both of the options (see Fig. 2b). Immediately after the monkey made a choice, the tray was removed in order to prevent the monkey from gaining access to the other alternative. Then, the 10 test trials were presented; each provided a choice between the unchosen option (either A or B, depending on the monkey's choice) and the novel yet equally preferred option, C. The position of the chosen and novel options was randomized across the 10 test trials.

The no-choice condition was identical to the choice condition except for the initial choice trial. In the no-choice condition, the monkey had no choice between the two initially presented options; instead, the experimenter kept one of the two openings closed during the choice period (see Fig. 2c), allowing the monkey to take only one of the M&M's (either A or B). The experimenter then presented the monkey with 10 test trials involving decisions between the unreceived alternative and the novel option, C, as described for the choice condition.

RESULTS

We first analyzed the children's performance on the rating task. On average, children tested in the choice condition and those tested in the no-choice condition completed ratings for the same total number of triads (ns = 4.13 and 4.40 triads, respectively).

Next, for each child we computed a percentage preference for the novel option, C, over the unchosen (choice condition) or unreceived (no-choice condition) option A or B (e.g., a child who chose C for four out of five triads would have a percentage preference score of 80%). We then compared the mean percentage preference for C across the choice and no-choice conditions. An unpaired t test revealed a reliable difference between the two conditions, $t(28) = 2.03, p = .05$, two-tailed. As depicted in Figure 3, children in the choice condition were more likely to prefer option C (mean percentage choice of C = 63.0%) than were children in the no-choice condition (mean percentage choice of C = 47.2%). Average choice of C in the choice con-
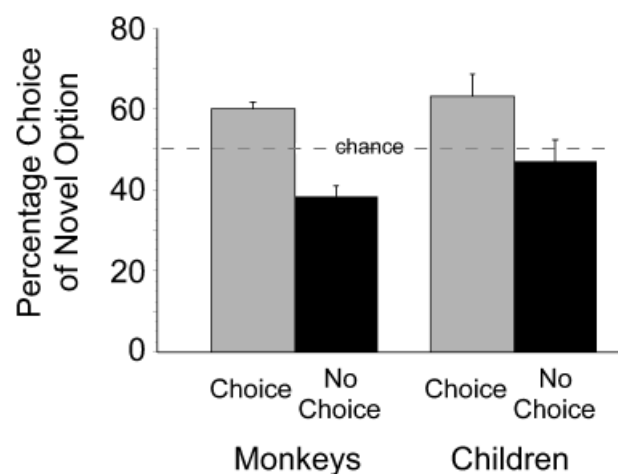
Fig. 3. Mean percentage of choices of the novel but equally preferred option (C) in the choice and no-choice conditions, for monkeys and children. Error bars indicate standard errors.

dition differed reliably from chance, according to a one-sample t test with a hypothesized mean of 50%, $t(14) = 2.28$, $p = .04$, two-tailed. This was not true for the no-choice condition, $t(14) = 0.53$, $p = .60$, two-tailed.

We performed similar analyses on the monkeys' percentage choice of option C. A repeated measures analysis of variance with condition (choice and no-choice) and order (first two sessions or second two sessions) as within-subjects variables revealed only a significant main effect of condition, $F(1, 5) = 32.5$, $p = .002$. The monkeys chose option C (mean percentage choice of C = 60.0%) more in the choice condition than in the no-choice condition (mean percentage choice of C = 38.3%; see Fig. 3). This pattern was confirmed by nonparametric analyses (paired sign: $p = .03$). In addition, the percentage of trials on which the monkeys chose C differed from chance in both conditions. A one-sample t test revealed that in the choice condition, the monkeys showed a significant preference for option C, $t(5) = 5.48$, $p = .003$. They showed the opposite preference in the no-choice condition, significantly preferring the unreceived over the novel option, $t(5) = 4.18$, $p = .009$. We did not anticipate this effect, but believe it may be attributable to the methodology of the no-choice condition: The monkeys saw the experimenter keep one option and give them the other. They may have interpreted this behavior as the experimenter choosing the better option for herself and offering them the inferior alternative. Such an interpretation may have caused them to inflate the value of the alternative "chosen" by the experimenter (see Lyons & Santos, 2007, for a similar finding).

DISCUSSION

Both children and capuchins demonstrated a decrease in preference for one of two equally preferred alternatives after they had chosen against it—but not when the experimenter had chosen against it. These results suggest that children and monkeys change their current preferences to fit with their past decisions. Like adult humans tested in similar paradigms, children and monkeys seem to derogate alternatives they have chosen against, changing their current attitudes and preferences to more closely match the choices they made in previous decisions.

Our present findings fit with those of previous studies involving preference changes in both children and nonhuman species. Previous studies using the forbidden-toy paradigm demonstrated that children change their attitude toward a toy that is associated with a potential mild punishment (Aronson & Carlsmith, 1963). Similarly, previous work showed that a number of bird species prefer items that are obtained with more effort (e.g., Clement et al., 2000; DiGian et al., 2004; Friedrich & Zentall, 2004; Friedrich et al., 2004). Unfortunately, the results of these latter studies can be interpreted without attributing dissonance reduction to the birds, as they may have preferred the option that required more work because of hedonic-contrast effects. The present study was better able to isolate the reasons for both children's and animals' attitude change because the only feature that differed between the experimental and control conditions was whether or not subjects made an intentional choice. Our subjects' attitude changes had to be due to the fact that they made a cognitive-dissonance-inducing decision, one that was discordant with their previous assessment that the two options were of equal value. The present study thus provides what we feel is a simpler and more direct demonstration of dissonance reduction per se than work performed previously. Moreover, we used nearly identical methods to demonstrate similar attitude changes in children and primates.

Our findings for young children challenge the idea that people's extensive experience with the negative consequences of their decisions teaches them to change their discordant attitudes. Because young children have relatively little experience with decision making, it is unlikely that the motivation to reduce cognitive dissonance can be attributed solely to past cognitive history. We recognize, of course, that 4-year-olds have some prior experience with the consequences of dissonant cognitions (though surely less than adults). For this reason, future studies with infants, who have virtually no experience with such cognitions, can clarify the extent to which experience plays a role in the development of dissonance-reduction mechanisms.

The fact that both children and nonhuman primates derogate unchosen alternatives raises the possibility that the drive to reduce dissonance is an aspect of human psychology that emerges without the need for much experience. Indeed, behavioral similarities between young human subjects and closely related primates are a signature of cognitive systems that are typically thought to be constrained across development, maybe even emerging innately. Such *core-knowledge* mechanisms have been proposed in other areas of cognition, such as the domains of numerical understanding (Feigenson et al., 2004; Wynn, 1992) and object cognition (Spelke, 2000), but have, to our knowledge, never before been proposed in the domain of attitude formation and change. The present results raise an interesting possibility: There may be some core aspects of cognition that give rise to cognitive dissonance as well. Our findings hint that some of the mechanisms that drive cognitive-dissonance-reduction processes in human adults may emerge as a result of developmentally and evolutionarily constrained systems that are consistent across cultures, ages, and even species.

The speculation that cognitive-dissonance reduction relies on core processes leads to other speculations concerning the nature of the mechanisms that drive it. Many core-knowledge mechanisms seem to operate in the absence of higher-level capacities that human adults possess, including language capacities, and also in the absence of social factors such as extensive teaching and socialization. It follows, then, that cognitive-dissonance reduction may not require these higher-level processes. One might further speculate that cognitive-dissonance reduction may be more automatic than has been previously suspected (see Lieberman, Ochsner, Gilbert, & Schacter, 2001, for support of this view). The exact mechanisms behind cognitive-dissonance

reduction have long been debated within social psychology: Whereas some researchers believe that dissonance is experienced as a threat to a cognitively and motivationally complex self (e.g., Steele & Liu, 1983), others argue that dissonance is due to much simpler processes (e.g., Bem, 1967; Festinger, 1957). If cognitive-dissonance reduction occurs in creatures that lack language and complex senses of self, then one must either accept that these processes are mechanistically simpler than previously thought or ascribe richer motivational complexity to populations that are thought to be less cognitively sophisticated than human adults, namely, monkeys and children.

Our study also has what we feel is an important methodological implication. Specifically, our work examining cognitive-dissonance reduction in monkeys and children illustrates the utility of incorporating comparative-developmental data in studying adult human social psychology and social psychological mechanisms. We hope that this study will pave the way for a more thorough investigation of the origins of some of the classic social psychological phenomena. Such an approach will allow researchers not only to determine the foundations of these phenomena in human development and evolution, but also to constrain hypotheses about the mechanisms underlying these phenomena.

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