

Arousal as a Necessary Condition for Attitude Change Following Induced Compliance

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This study examined whether arousal is or is not a necessary condition for attitude change in the induced compliance paradigm. In a 2×3 design, experimental subjects were induced to write counterattitudinal essays under either high- or low-choice conditions. All subjects were led to believe that a pill, which they had just taken in the context of a separate experiment, was a placebo. In reality, subjects were given a pill that contained either phenobarbital (tranquilizer condition), amphetamine (amphetamine condition), or milk powder (placebo condition). In this last condition, the results yielded the usual dissonance effect: High choice produced more attitude change in the direction of the essay than low choice. When subjects were given a tranquilizer, this effect was virtually eliminated; when subjects were given amphetamine, attitude change increased under high choice and was exhibited for the first time under low choice. These results are consistent with the notion that attitude change is in the service of reducing arousal and with the idea that arousal from other sources can be misattributed to attitude-discrepant behavior.

When a person holds two or more cognitions that are inconsistent, dissonance is said to be aroused (Festinger, 1957). According to Festinger, dissonance is experienced as an unpleasant tension state that an individual seeks to reduce. When one's attitude is at variance with one's behavior, attitude change may occur as a way to ease the unpleasant tension state.

Linking Arousal to Inconsistent Cognitions

What evidence is there that inconsistent cognitions do lead to arousal? Zanna and

Cooper (1974) provided indirect evidence for this proposition, utilizing the concept of emotional labeling. Since the early work of Schachter and Singer (1962), several studies have indicated that subjective emotional experience is based upon a combination of physiological arousal and a cognitive label that explains that arousal. Common to many of these studies is the notion that if one typically uses social cues or other external cues to explain arousal and thus to define an emotion, then one can also be given erroneous cues that will cause one to misattribute the source of arousal and arrive at an incorrect explanation of that arousal (e.g., Ross, Rodin, & Zimbardo, 1969; Storms & Nisbett, 1970).

Zanna and Cooper reasoned that since Schachter and Singer's subjects had readily accepted an external cue to explain their arousal, subjects in a dissonance experiment could also be supplied with an external cue to which to misattribute their dissonance arousal. Believing their arousal was due to

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something else, subjects would have no need to change attitudes as a means of reducing dissonance. To test this notion, Zanna and Cooper placed subjects in an induced compliance situation in which they either volunteered to or were told to write counterattitudinal essays. It has been well established that dissonance following attitude-discrepant behavior is aroused only under circumstances in which people perceive themselves to have acted of their own free will (e.g., Linder, Cooper, & Jones, 1967). Thus, dissonance-mediated attitude change was expected in the high decision-freedom condition. However, Zanna and Cooper supplied some of the subjects in the high decision-freedom condition with an external cue with which to "explain away" their dissonance arousal. It was predicted that these subjects would show little or no need to reduce dissonance.

All subjects in the Zanna and Cooper (1974) study were led to believe that they had been given a drug (which was actually a placebo) as part of a memory study. Some subjects believed that the pill they had taken would make them feel aroused and tense. Others believed that the pill would have no effect, while a final group believed that the pill would relax them. After ingesting the pill, subjects were either asked or told to participate in the writing of the counterattitudinal essay, allegedly as part of another study. Zanna and Cooper hypothesized that subjects in the high-choice condition of the essay writing task would experience dissonance, but that the portion of the high-choice group who had been given the allegedly arousing pill would falsely attribute their arousal to the drug. Consequently, it was predicted that subjects in the high-choice arousal condition would not evidence attitude change. Attitude change was expected only when high-choice subjects had not been given a pill that they believed would arouse tension. In addition, it was predicted that subjects who expected to feel relaxed by the pill but who still felt the effects of cognitive inconsistency would become more upset by that inconsistency and evidence even greater attitude change. These predictions were all supported by the attitude-change data from Zanna and Cooper's study, suggesting that

dissonance is indeed experienced as psychological arousal.

Additional evidence consistent with the notion that dissonance has arousal properties was obtained by Worchel and Arnold (1974). Those investigators found that attitude change was affected additively by the presumed arousal produced by induced compliance and the arousal created by interrupting a communication prior to its completion.

Arousal: Is It Necessary?

The studies by Worchel and Arnold (1974) and Zanna and Cooper (1974), as well as studies employing a learning interference paradigm (e.g., Cottrell & Wack, 1967; Pallak & Pittman, 1972; Waterman & Katkin, 1967), have provided evidence that indirectly links attitude-discrepant behavior with arousal.¹ These studies argued, in effect, that if a certain effect occurred, then the only way to explain that effect was through the concept of arousal. In Zanna and Cooper's study, for example, the concept of emotional misattribution was used to argue that an external label could reduce the magnitude of attitude change following induced compliance only if induced compliance causes autonomic arousal. One purpose of the present experiment was to provide more direct evidence about the role of autonomic arousal in dissonance reduction.

A second question left unanswered by previous work is whether arousal is a *necessary condition* in order for attitude change to occur in an induced compliance situation. In the classical statement of dissonance theory (Festinger, 1957), attitude change is motivated by a desire to reduce arousal. Zanna and Cooper demonstrated that arousal is *associated* with the induced compliance situation. But this does not mean that arousal *must* occur in order for attitudes to change. In the present study, we seek to demonstrate this link. By manipulating autonomic arousal

¹ For a complete review of recent research on the arousal properties of dissonance-induction procedures, the reader is referred to Zanna and Cooper (1976) and to Kiesler and Pallak (1976).

orthogonally from the theoretical causal conditions that produce cognitive dissonance, we attempt to show that attitudes will change following counterattitudinal behavior if and only if arousal accompanies the behavior.

By manipulating arousal independently, the present study also provides the context in which to replicate the earlier findings of Worchel and Arnold (1974) that arousal from another source can be misattributed to the dissonance, thus producing even greater attitude change.²

Method

Subjects

Sixty-three university students volunteered for a study on the effects of drugs on short-term memory. In advance of their participation, subjects were assured that only safe, nonhallucinogenic drugs would be used and were promised \$2 for their participation. All subjects were run individually.

Procedure

When the subject arrived at the experimental room, the experimenter explained the alleged purpose of the study. He said:

We have asked you to come here today to participate in an experiment on memory processes. Specifically, we have been working with the effects of various drugs on a person's short-term memory. So what we will do is to give you an experimental drug and investigate its effect on your ability to recall. I want to stress that all of the drugs we are using are perfectly safe and have been cleared for use by the University Health Service. In a moment, you will be assigned, quite at random, to one of our drug conditions. The active ingredient in one of the drugs is a small dosage of amphetamine. The active ingredient in the other drug is a small dosage of a tranquilizer called phenobarbital. Or, you may be assigned to a placebo condition in which the drug you will take is merely made of milk powder.

The subject, whose medical records were carefully screened prior to the study, was asked to sign a consent form agreeing to take any of the three possible drugs.

The experimenter then informed the subject that the first task in the study was a memory pretest. Subjects were presented, visually, with a series of 15 nonsense syllables. Each syllable was presented for approximately 5 sec, after which the next syllable appeared. Each syllable consisted of a vowel interposed between two consonants. After the entire series of syllables had been presented, subjects were given

1 min in which to write down, in any order, as many of the syllables as they could remember.

Manipulation of arousal. After taking the short-term memory test, subjects were assigned to experimental conditions. The experimenter said:

I am now going to give you a capsule that contains your drug. In order to keep the study controlled appropriately, even I do not know which of the three drugs you will be getting. You will know, because the paper in which your capsule is wrapped describes the drug to you. Please do not tell me which drug you have received.

In the present study, *all* subjects were informed that they were in the placebo condition. The paper in which their capsule was wrapped stated, "The enclosed capsule contains a placebo. It is pure milk powder. There will be no side effects of this substance whatsoever." In truth, however, most subjects did *not* receive milk powder. Contrary to what they had been told, the experimenter—blind to condition and with adequate medical supervision—administered either 5 mg of dextroamphetamine or 30 mg of phenobarbital. These dosages are considered the appropriate effective dosages for the respective drugs (Goodman & Gilman, 1965). An additional group of subjects was assigned to the milk powder condition and did receive only the placebo that they had been led to expect.

Manipulation of dissonance. Shortly after the subjects took their capsules, the experimenter reminded himself of another experiment that was being conducted for the University Research Institute. The experimenter explained:

We must wait approximately 20 minutes for either of the active drugs to take effect. If you are in the placebo condition, we must wait in order to keep factors constant. In either case, then, we have some time on our hands, and there is another research project that you could participate in.

The University Research Institute is preparing a report on students' reactions to the pardoning of former President Richard Nixon . . . We think we know how most students feel about this issue.

At this point, the experimenter waited for an acknowledgment that the student felt negatively about the Nixon pardon. Then he continued:

Past experience has indicated that one of the best ways to understand what the relevant arguments

² It should be noted that Brock (1963), in a correlational study, also found that arousal from another source (in this case, cheating) apparently did combine with dissonance arousal to produce greater postdecision reevaluation of decision alternatives (see also O'Neal, 1971, and Pittman, 1975).

are on both sides of any issue is to ask people to write essays favoring only one side. Therefore, what we would like you to do is to write the strongest, the most forceful essay that you can taking the position that the pardon for Richard Nixon was justified.

The degree of dissonance was manipulated by varying the degree of decision freedom that subjects were given to write their attitude-discrepant essays. Subjects in the high-choice (or high-dissonance) condition were told, "I will leave it entirely up to you to decide if you would like to help the Research Institute by writing the essay." All subjects agreed to help.

In the low-choice (or low-dissonance) condition, the experimenter omitted all reference to a choice and merely gave the subject a paper on which to write the essay.

The writing of the counterattitudinal essays was timed in order that subjects would be finished at about the time the drug took effect. It is estimated that 20–30 min are typically required for complete absorption of the two active drugs (Goodman & Gilman, 1965). Therefore, the instructions and the writing of the essay were planned to take about 35 min to ensure that the drugs would be active for all subjects in the stimulant and tranquilizer conditions.

On conclusion of the essay writing, the subjects were asked to fill out an anonymous questionnaire for the University Research Institute that included several items concerning political events. The crucial item asked subjects to indicate, on a 31-point scale, the degree to which they agreed or disagreed with the pardoning of Richard Nixon. Subjects were also instructed to indicate, on a 7-point scale, the extent to which they felt that they had freely decided to write their essays.³

Finally, subjects were given the memory task a second time. This was done in order to make certain that subjects in each condition were capable of attending to the stimulus materials equally despite the drug they had taken. After the memory test, they were thoroughly debriefed.

Survey Control Condition

Ten additional subjects came to the laboratory in response to an advertisement requesting volunteers for an "attitude survey." They reported to the laboratory individually and were asked to fill out a short attitude questionnaire, which included the critical question concerning the pardon of Richard Nixon.

Results and Discussion

Three subjects were eliminated from the analyses: two because they indicated pro-pardon attitudes and one because of reported suspicion. Although the experimenter was blind to the experimental condition of the

Table 1
Mean Scores of Attitudes Toward the Pardoning of Richard Nixon

Decision freedom	Drug condition		
	Tran- quilizer	Placebo	Amphet- amine
High choice	8.6 _a	14.7 _b	20.2 _a
Low choice	8.0 _a	8.3 _a	13.9 _b

Note. $n = 10$ subjects per cell. Higher means on the 31-point scale indicate greater agreement with the attitude-discrepant essay. Cell means with different subscripts are different from each other at the .05 level by the Newman-Keuls procedure. The mean in the survey control condition is 7.9_a.

subject, he attempted to "guess" the condition from the subject's appearance or behavior. The experimenter's correct guesses were no greater than chance.

The results of the attitude measure are presented in Table 1. A 2×3 analysis of variance revealed that the expected main effects and the interaction were significant, $F(1, 54) = 11.38$, $p < .01$; $F(2, 54) = 8.60$, $p < .01$; $F(2, 54) = 4.21$, $p < .05$, for the decision-freedom effect, drug-type effect, and interaction, respectively.

An examination of the individual comparisons, however, provides a more exact test of the hypotheses. The results of the placebo condition represent a standard replication of an induced compliance study. The data showed that the dissonance-produced attitude change was obtained. High-choice placebo subjects were in greater agreement with the Nixon pardon than their low-choice counterparts. Taking the survey control as the baseline, attitude change occurred only in the high-choice condition.

Interesting effects begin to emerge when the results of those who took active drugs are examined. High-choice subjects who took tranquilizers did not show any dissonance reduction. They showed no differences in attitude from the survey control group or from the low-choice placebo group. More importantly, the high-choice and the low-choice

³ No manipulation check on the arousal manipulation was conducted, since there is ample indication that the drug quantities used are effective dosages.

tranquilizer groups did not differ from each other.

The amphetamine condition tells a different story. Here, attitude change was found in both the high-choice and low-choice variations. In the high-choice condition, subjects changed their attitudes more than in any other condition in the experiment; in the low-choice condition, subjects exhibited attitude change, but only to the extent of those in the high-choice placebo condition. The interaction produced by these effects was significant, $F(2, 54) = 4.21, p < .05$.

These results would seem to indicate that arousal is a necessary component of the attitude-change process under conditions of induced compliance. In the high-choice conditions, drug-induced arousal augmented dissonance-induced attitude change when there was no external cue to explain the extra arousal. These results conceptually replicate the high-choice findings of Worchel and Arnold (1974). More interestingly, the unexplained, drug-induced relaxation served to counteract dissonance arousal and to alleviate the need for attitude change as a mode of dissonance reduction.

Evidence from the test of short-term memory, which subjects took before and after the essay writing, revealed no differences among groups. Therefore, it is not likely that the differences on the attitude data were caused by differences in attentiveness that conceivably might have been produced by the drugs. In addition, the essays that subjects wrote were analyzed for length and were rated for quality and convincingness (both on 7-point scales) by two independent judges. There were no systematic differences in the length of the essays (all $F_s < 1$), nor were there differences on the quality or convincingness measures (all $F_s < 1$). The interjudge reliabilities for these measures were .83 and .88, respectively. This would make unlikely an interpretation of the attitude data based upon systematic differences in essay-writing performance.

If one looks again at the data from the low-choice conditions, an interesting pattern emerges. Whereas eliminating decision freedom usually has the effect of eliminating dissonance, subjects in the low-choice am-

Table 2
Mean Perceptions of Freedom to Write Essay

Decision freedom	Drug condition		
	Tranquilizer	Placebo	Amphetamine
High choice	5.8 _a	6.0 _a	6.1 _a
Low choice	2.2 _b	2.1 _b	5.6 _a

Note. $n = 10$ subjects per cell. Higher means on the 7-point scale indicate greater perceived freedom. Cell means with different subscripts differ from each other at the .05 level by the Newman-Keuls procedure.

phetamine condition were in an unusual predicament. They had behaved in a counterattitudinal fashion, and, despite knowing that they had followed an experimenter's order, they nonetheless felt aroused. The only attribution they apparently could make was that they were upset by the inconsistency between their cognitions. It has been pointed out that a lack of decision freedom renders two otherwise discrepant cognitions in a cognitive relationship irrelevant (e.g., Cooper, 1971). But the arousal induced by the amphetamine must have convinced subjects that their cognitions were not at all irrelevant and that the subjects were in some way responsible for their attitude-discrepant behavior, despite the experimenter's coercion.

The data concerning subjects' perception of their freedom to decline the experimenter's essay-writing request provide an insight into the attitude change evidenced by low-choice amphetamine subjects (see Table 2). In all conditions except one, subjects accurately recalled the choice they had been given. In contrast, subjects in the low-choice amphetamine condition reported feeling a high degree of choice. In other words, feeling aroused, the subjects apparently deduced that they were in some way responsible for having engaged in attitude-discrepant behavior. In this instance, then, amphetamine arousal appears to have been misattributed to the attitude-discrepant behavior.

In conclusion, it appears that autonomic arousal is necessary for attitude change to occur in induced compliance situations. When a drug, unbeknownst to the subjects, reduced

their autonomic arousal, attitude change did not occur, despite their engaging in attitude-discrepant behavior under conditions of high choice. Conversely, increasing autonomic arousal with amphetamine caused subjects to increase their opinion change, even if the attitude-discrepant behavior was committed under conditions of low choice. Although a lack of freedom usually has the effect of eliminating dissonance, chemically heightened arousal gave participants in this condition cause to attempt to reduce this arousal through attitude change.

Arousal has often been regarded as a heuristic device in the formulation of dissonance theory. By systematically varying the degree of arousal as one of the independent variables, the present evidence suggests that, at least when subjects are induced to perform counter-attitudinal behavior, attitude change would appear to be at the service of reducing autonomic arousal.

References

- Brock, T. C. Effects of prior dishonesty on post-decision dissonance. *Journal of Abnormal and Social Psychology*, 1963, 66, 325-331.
- Cooper, J. Personal responsibility and dissonance: The role of foreseen consequences. *Journal of Personality and Social Psychology*, 1971, 18, 354-363.
- Cottrell, N. B., & Wack, D. L. The energizing effect of cognitive dissonance on dominant and subordinate responses. *Journal of Personality and Social Psychology*, 1967, 6, 132-138.
- Festinger, L. *A theory of cognitive dissonance*. Stanford, Calif.: Stanford University Press, 1957.
- Goodman, L. S., & Gilman, A. *The pharmacological basis of therapeutics* (3rd ed.). New York: Macmillan, 1965.
- Kiesler, C. A., & Pallak, M. S. Arousal properties of dissonance manipulations. *Psychological Bulletin*, 1976, 83, 1014-1025.
- Linder, D. E., Cooper, J., & Jones, E. E. Decision freedom as a determinant of the role of incentive magnitude in attitude change. *Journal of Personality and Social Psychology*, 1967, 6, 245-254.
- O'Neal, E. Influence of future choice importance and arousal upon the halo effect. *Journal of Personality and Social Psychology*, 1971, 19, 334-340.
- Pallak, M. S., & Pittman, T. S. General motivational effects of dissonance arousal. *Journal of Personality and Social Psychology*, 1972, 21, 349-358.
- Pittman, T. S. Attribution of arousal as a mediator in dissonance reduction. *Journal of Experimental Social Psychology*, 1975, 11, 53-63.
- Ross, L., Rodin, J., & Zimbardo, P. G. Toward an attribution therapy: The reduction of fear through induced cognitive-emotional misattribution. *Journal of Personality and Social Psychology*, 1969, 12, 279-288.
- Schachter, S., & Singer, J. E. Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, 1962, 69, 379-399.
- Storms, M. D., & Nisbett, R. E. Insomnia and the attribution process. *Journal of Personality and Social Psychology*, 1970, 2, 319-328.
- Waterman, C. K., & Katkin, E. S. The energizing (dynamogenic) effect of cognitive dissonance on task performance. *Journal of Personality and Social Psychology*, 1967, 6, 126-131.
- Worchel, S., & Arnold, S. E. The effect of combined arousal states on attitude change. *Journal of Experimental Social Psychology*, 1974, 10, 549-560.
- Zanna, M. P., & Cooper, J. Dissonance and the pill: An attribution approach to studying the arousal properties of dissonance. *Journal of Personality and Social Psychology*, 1974, 29, 703-709.
- Zanna, M. P., & Cooper, J. Dissonance and the attribution process. In J. H. Harvey, W. J. Ickes, & R. F. Kidd (Eds.), *New directions in attribution research* (Vol. 1). Hillsdale, N.J.: Erlbaum, 1976.

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