Pakistan Journal of Psychological Research, 2008, Vol. 23, Nos. 3-4, 83-92

The Process of Commitment, Escalation, and Incentive Yields Energy Conservation

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The study examined the effect of the process of commitment, escalation of behaviour, and incentive on the energy conservation behaviour; including the role of informational feedback in this process. Pretest-posttest, control group design was utilised. Experimental Group 1 was persuaded to make a commitment by signing a form to conserve their electric energy consumption in a successively 3-stage process and to reduce their electric consumption respectively by 5, 10, and 15 per cents. For Experimental Group 2, the process was same except for the informational feedback given to the participants in each stage for their conservational behavior in the previous stage. Experimental groups reduced their electric consumption significantly more than control group. Feedback had nonsignificant effect on the conservational behavior in this process.

Keywords: Commitment, escalation, incentive, feedback, energy conservation

In a period of rising energy prices and potential shortages, energy conservation seems to be intuitively essential. In its most general sense, energy conservation can be defined as the deliberate reduction in the use of energy below some level that would prevail otherwise (Munasinghe & Schramm, 1983). Such reduction is not just a technical issue but also a social and psychosocial one, requiring some changes in people's behavior (Oskamp, 2000).

On the basis of theory of dissonance, researchers defined the *commitment* as persuading someone to do an act or to make a decision (Oskamp, 1997). In the field of energy conservation Pallak, Cook, and

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Sullivan (1980) initiated a research using the commitment. In two experiments they examined the effect of commitment on the consumption of electricity and natural gas for participating households. They encouraged one experimental group to make a public-commitment to minimize their energy consumption and they were told that the result of study would be publicized along with the names of participants' public-commitment. A second group of participants were asked to make a verbal-commitment, but were assured of anonymity. The results showed that participants who had made a public-commitment had reduced their energy consumption from 10% to 20%. There was nonsignificant change in energy consumption for the group that made a private-commitment. Katzev and Johnson (1984) have confirmed these results in a similar study.

A number of experiments indicate that if you want people to do a big favor for you, it is wise to get them to do a small favor first.This process is called *escalation* (Aronson & Helmreich, 1973). *Escalation* may be defined as to be committed to bad decisions (Corsini, 1999), and researches used it in bad decisions (see, for example, Bolt & Myers, 1984). Although, energy conservation does not seem to be a bad one, it is used in the present research because it seems that these two (good and bad) are inseparable. As Festinger stressed in his cognitive dissonance theory, each decision has both negative and positive aspects (as cited in Jones & Mills, 2000). For example, energy conservation has a good aim, it has negative aspects too, because it is time consuming and a demanding job for participants.

In the best-known demonstration of this, Freedman and Fraser asked housewives in California to place a large, ugly "Drive Carefully" sign on their front lawns. Tests showed that they were more likely to do this if they had first been asked to do the smaller favor of signing a safe driving petition (as cited in Bolt & Myers, 1984). This experiment which made use of escalation also has a good aim --- drive carefully. Milgram's experiments is also a case of escalation which starts rather innocently as an experiment in memory and then gradually escalates to give shocks to a learner and raise them by 450 volt (as cited in Smith & Mackie, 2000).

Previous research has shown that feedback, alone can cause energy consumption by 10-20% (Oskamp, 1997). In some field experiments, money incentive had an effect on energy conservation, but this effect was nonsignificant. Study (see, for example, Oskamp, 1997) did not mention more than 10%. Energy consumption is now playing a key role in industrial development and is vital for

substantial development. Therefore, it should be implemented by all possible means, despite of its limitations (Dincer, 2003).

The present research was conducted to determine the effect of process of creating commitment and escalation on the electric energy consumption behaviour. The researchers also examined the effect of informational feedback and incentive in this process. The following hypotheses were tested in this study:

1. Electricity consumption would significantly decrease in the three persuasion stages (5, 10, and 15 per cent reduction persuasion).
2. The Experimental Group 1 (feedback-commitment group) and Experimental Group 2 (nonfeedback-commitment group) would significantly consume less electricity than do the control group.
3. The feedback-commitment group would significantly consume less electricity than do the nonfeedback-commitment group.
4. There would be a significant interaction between group membership and stages, that is, as the groups progress through the stages their differences in consumption would be changed.

Method

Sample

From three parts of Isfahan city (south, north, and west), on the basis of stratified random sampling, 81 household subscribers, with different demographic characteristics, were selected as the participants of the present study. They were assigned randomly into two experimental and one control groups making a total of 243 participants (having 81 participants in each group). Most of the participants were men, ranged from 25 to 70 years old and having education from illiterate to M.A.

Instruments

The researchers developed the following forms for creating commitment and giving feedback:

1. *Creating Commitment Form.* This form confronted the participants of the two experimental groups with the question of whether they were ready to participate in the electricity energy conservation programme or not. Giving positive response (signing the form) to this question served as the creating commitment.

2. *Escalation Forms.* In each stage of this research, participants received these forms (after signing the creating commitment form in the first stage), asking them to reduce their electric consumption compared to their baseline consumption respectively by 5, 10, and 15 per cent. These forms were called Escalation Forms.

3. *Informational Feedback Forms.* These forms informed the experimental group 2 against the degree of their electric consumption during each stage of the research. These forms also informed them to what degree they approached to winning prizes which served as the incentives.

Procedure

At first the electric meters readings of all the subscribers (both experimental groups and control group) were taken, but nothing was said to them about the content of experiments. After 14 days their meters were read again and by subtracting the present reading from the previous reading, the baseline of their electric consumption for a period of 14 days was determined.

On the first stage of the experiment, participants of the two experimental groups were persuaded to participate in this research by promising them that if they had the desired reduction, they would win a prize. They were asked to sign the Creating Commitment Forms. Then the two experimental groups were asked to reduce their electric consumption by 5% in the next 14 days compared to their baselines. They were given guidelines about how they can reduce their electric consumption by 5%. The baseline of control group was also determined, but nothing was said about the conservation program to them, and they were not asked to sign any forms. In fact, during the research only the degree of their electric consumption during each stage was determined and nothing else was done with them.

In the second stage (after 14 days), after determining the degree of electric consumption of both experimental groups and control

group and giving feedback only to experimental group 2 (no feedback was given to experimental group 1). Both experimental groups were then asked to reduce their electric consumption by 10%. In the third stage following 14 days, it was compared to their baselines. In the final stage, after determining the degree of electric reduction of control and experimental groups, and giving feedback only to experimental group 2, the participants of the two experimental groups were asked to reduce their electric consumption in the following 14 days by 15%. At the end of the final 14 days period, just the degree of electric consumption of subscribers was determined.

Results

Since a 3 x 3 experimental design (3 experimental conditions [2 treatment and one control] and three repeated measures of electric consumption for each group in three stages) was used in this study, a repeated measures analysis of covariance was performed on the data. Analysis of within subjects' effects are shown in Table 1.

Table 1

Within Subject Analysis of Covariance of Three Measures of Electric Consumption and Interaction with Group Membership

Source		Type III *SS*	*df*	*MS*	*F*	*p*	Eta Squ	Observed Power(a)
Measures		119.58	1	119.58	0.15	.690	.001	.07
Measures x Group		5491.16	2	2745.58	3.65	.028	.039	.67
Error (Factor 1)		136584.50	182	750.46				

Table 1 suggests that the differences between the three measures are nonsignificant. Therefore, the first hypothesis was not supported. However, the interaction between measures and group membership (2 experimental and 1 control group) was significant (p = .028). This interaction will be examined later in relation to Table 3.

The results of between groups analysis of variance of electricity consumption are presented in Table 2. In this analysis the variables (covariates) were controlled, that is, their effects on consumption were removed and then the groups were compared. These were baseline consumption, education, family size, house area, and economic status.

Table 2
Analysis of Covariance of the Effect of Group Membership on Electricity Consumption

Source	Type III SS	*df*	*MS*	*F*	*p*	Eta Squ	Observed Power(a)
Intercept	327.28	1	327.28	0.24	.62	.001	.08
Baseline	563778.23	1	563778.23	429.34	.001	.702	1.00
Education	259.89	1	259.89	0.19	.66	.001	.07
Family size	3674.90	1	3674.90	2.79	.1	.015	.38
House area	303.95	1	303.95	0.23	.63	.001	.08
Economic status	3959.69	1	3959.69	3.01	.08	.016	.41
Group	19541.71	2	9770.85	7.44	.001	.076	.94
Error	238983.96	182	1313.09				

Table 2 shows that the differences between the three groups were significant ($p < .001$). Since the interaction between measures and group membership was significant, the fourth hypothesis was supported (Table 1, $p < .028$) and the comparison of all 9 groups (3 x 3 groups) became necessary (see Table 3).

Table 3
Comparisons of the Experimental and Control Groups on the Three Stages of Measurement of Electricity Consumption

Measurement Stage	Group Comparison	*B*	*t*	*p*	Eta Squared	Observed Power(a)
First	1 vs 3	-5.65	1.16	.247	.007	.21
	2 vs 3	-10.02	2.14	.034	.025	.57
Second	1 vs 3	-11.1	2.38	.018	.030	.66
	2 vs 3	-8.95	1.99	.048	.021	.51
Third	1 vs 3	-24.50	4.59	.000	.104	1.00
	2 vs 3	-16.55	3.22	.001	.054	.89

Note. Group 1 = feedback group; Group2 = nonfeedback group; Group 3 = control group.
Nonsignificant differences were observed in Group 1 and Group 2 on all three stages, therefore not reported in the Table.

Table 3 shows the comparison of experimental groups 1 and 2 with the control group 3. As can be seen in Table 3, except for Group 1 in the first stage, all other comparisons are significant ($p < .05$).

Table 4

Per cent Difference in Electricity Consumption of Experimental and Control Groups on Each Measurement Stage from Baseline Measure

Measurement stage	Experimental Groups [a]		Control Group [b]
	Group 1	Group 2	
First	6.72	10.79	2.55
Second	10.02	8.70	4.20
Third	18.57	14.28	7.91

Note: Group 1 = Feedback group; Group 2 = Nonfeedback group.
[a] on all stages there was per cent reduction in electricity consumption from baseline measure for experimental groups.
[b] on all stages there was percent increment in electricity consumption for control group.

Table 4 shows that for both experimental groups, there is reduction in electricity consumption on all three stages. Experimental Group 2 showed maximum reduction in stage 1, while, Experimental Group 1 showed in remaining next two stages. Contrary to this, control group showed percent on all the stages from the baseline.

Discussion

The present research was concerned with the effect of the process of creating commitment and escalation on the electric energy consumption. According to Table 1, the differences between the three measures are nonsignificant ($p = .69$), so the first hypothesis, that is consumption significantly decreases in the three persuasion stages (5, 10, and 15 percent reduction persuasion) was not supported. As Table 3 shows, the two experimental groups in all stages consumed significantly less electric power than the control group except for the experimental group 1 (feedback group) in first stage ($p = .247$; Table 3). Although, experimental group 1, consumed less electric power in the first stage, but it conserved electric power, nearly at the same degree, i.e., 5%. These results indicated the significant effect of creating commitment and escalation and incentive on electric energy

consumption, but showed that feedback had nonsignificant effect in this process. Therefore, second hypothesis was supported and third was refuted. Interaction between measurement in stages and group membership (Table 1) found to be significant, hence accepting the fourth hypothesis.

In stage 1, the creating commitment resulted in a significant difference between the experimental group 2 (nonfeedback group) and control group, whereas the other experimental group 1 (feedback group) shows nonsignificant difference with control group (Table 3). Because the same procedure was applied to both experimental groups in this stage, and results were different, we encountered a new challenge. The results show that in this stage the control group increased their electric energy use by 2.55% as compared to their baseline, whereas experimental group 1 reduced their electric energy use by 6.72% and experimental group 2 reduced their electric use by 10.79% compared to their baseline (Table 4).

It is very interesting that although in this stage participants were asked to reduce their consumption by 5%, but they reduced more than this. For example, experimental group 2, reduced their consumption about 10.79%, and this shows the effect of incentive. Pallak et al.'s study (1980) which used public-commitment as independent variable showed a 24% reduction in energy consumption. The difference between the results of this stage and other stages of this process with their study may be rooted in the way of creating commitment and also in the degree of reduction the researchers expected from participants. For example, at the first stage of present study, participants were asked to reduce electric energy by 5% compared to their baseline whereas Pallak and his colleagues expected their participants to reduce electric energy at the maximum rate. In any case, in this research participants reduced their electric use more than what the researchers expected.

Now it can be explained why feedback had no effect in this process by using the concept of "approach gradient" that means gradual variation in the strength of a drive as an organism approaches its goals (Corsini, 1999). This means that approaching a goal has a reinforcing effect. So in spite of receiving no informational feedback the experimental group 2 who found itself near the final stage (receiving reward) reduced their electric consumption to such degree that no significant difference appeared between the two experimental groups. The concept of approach gradient can explain why the result of feedback in the process of this research differs from the previous

studies which showed a significant reduction in the energy consumption when using feed back (see Oskamp, 1997).

In the Pallac and Cummings' study (as cited in Oskamp, 2000), public-commitment meant that the degree of reduction of energy consumption of participants publicized which had a reinforcing effect and resulted in strengthening the desired behavior. In present research, the reinforcement used was in the form of promising the participant to receive rewards depending on the degree of their electric energy reduction.

The percentages of reduction of the two experimental groups compared to control group show the power of the process used in this research and that people are ready to escalate their behaviours following the commitment they make. As far as the researchers know it was the first research in the field of energy conservation on the basis of findings of social psychology in Iran.

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Received January 01, 2005

Revision received February 23, 2008