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A repeated measures control group experiment, designed in the group polarization tradition, revealed significant shifts in responses to tasks after group discussion. A process incorporating converging perspectives on task design - whereby employees form initial reactions to tasks, process incoming social information, and adjust their perceptions accordingly - is suggested.

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Organizations As Information Processing Systems

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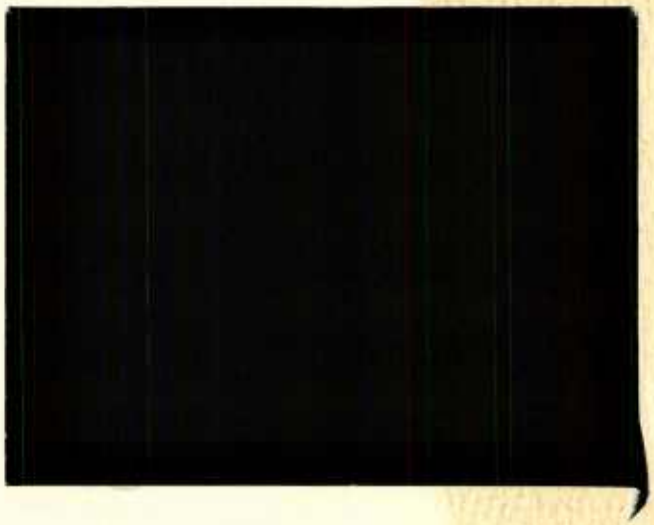

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TR-ONR-DG-01 Joe Thomas and Ricky W. Griffin.
The Social Information Processing Model of Task Design:
A Review of the Literature. February 1983.

TR-ONR-DG-02 Richard L. Daft and Robert M. Lengel.
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TR-ONR-DG-03 Ricky W. Griffin, Thomas S. Bateman, and James Skivington.
Social Cues as Information Sources: Extensions and Refinements.
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Toward a Model of Organizations As Interpretation Systems.
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TR-ONR-DG-05 Thomas S. Bateman, Ricky W. Griffin, and David Rubenstein.
Social Information Processing and Group-Induced Response
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Social Information Processing and Group-Induced Response Shifts

Extensive research has explored the effects of task design on the perceptual, affective, and behavioral responses of employees (cf., Griffin, 1982). In the past decade, task design research has been dominated by the job characteristics model (Hackman & Lawler 1971; Hackman & Oldham, 1976). However, mixed research results have led to several critical statements about their framework and given rise to a number of alternative perspectives (cf., Blau & Katerberg, 1982; Roberts & Glick, 1982).

Perhaps the most influencial alternative framework of the last several years has been the social information processing (SIP) model proposed by Salancik and Pfeffer (1978). According to this approach, individuals' perceptions of and responses to their jobs are caused not only by their evaluations of their tasks but by other information, such as that provided by the social context. In fact, Salancik and Pfeffer argue that social information is an even more powerful determinant of task perceptions, attitudes, and behaviors than objective task characteristics. More specifically, an employee's social environment provides cues regarding what dimensions should be used to describe the work environment, how these pertinent dimensions should be weighed, how others evaluate the work environment on each dimension, and possibly a direct positive or negative evaluation of the work setting (Pfeffer, 1981).

Several published laboratory studies have independently varied objective task characteristics and social cues about the task (O'Connor & Barrett, 1980; O'Reilly & Caldwell, 1979; Weiss & Shaw, 1979; White and Mitchell, 1979). Results have consistently supported the influence of social information; effects on task perceptions or affective reactions have been just as pronounced for social cues as for objective task manipulations. The SIP approach has thus been solidly established as a valid perspective on task design and employee

responses, just as the task characteristics model was in the early 1970's.

Most recently, however, the stream of SIP theorizing and research has itself become the focus of critical reviews. Two review articles (Blau & Katerberg, 1982; Thomas & Griffin, 1983) have highlighted a number of substantive deficiencies in the extant literature. Furthermore, investigators have attempted to design more realistic laboratory experiments in response to perceived methodological shortcomings in the earlier studies such as potentially powerful demand characteristics (Blau, 1983; Griffin, Bateman, and Skivington, 1983). In contrast to the earlier studies, predominantly null results were obtained.

Both Blau (1983) and Griffin, et al. (1983) used two cues from each confederate social information source, communicated to the subject while (s)he was working on the task. In each study, this weaker but more realistic manipulation was used explicitly to lessen the demand characteristics that may have been present in earlier studies, which contain manipulations ranging from numerous and/or very frequent unanimous cues (O'Connor & Barrett, 1980; Weiss & Shaw, 1979; White & Mitchell, 1979) to the presentation of written evaluations of the experimental task to subjects after they had completed the task and immediately before they were administered the post-experimental questionnaire (O'Reilly & Caldwell, 1979).

Blau's (1983) social cue manipulations ranged from positive to neutral, as opposed to the positive to negative range present in all other studies except Weiss and Shaw (1979). Strongly significant manipulation checks indicated that his null results occurred despite subject's awareness of the espoused attitudes of the confederate coworkers. Griffin, et al. (1983) also attempted to inject more realism into their SIP study by not only reducing demand characteristics but also by simultaneously manipulating social cues from a supervisor and a coworker. As such, previously cited (Blau and Katerberg, 1982); Thomas and Griffin, 1983) shortcomings in the laboratory research--the testing of only

unanimous cues, the sole use of coworkers rather than leaders as a source of social information, and a reliance on single rather than multiple cue sources--could be addressed through the creation of mixed cues as well as unanimous cues emanating from two important sources. These combinations, in conjunction with the less frequent, more realistic delivery of cues, were presumably more representative of the work context to which SIP laboratory studies aspire to generalize.

As with Blau's (1983) study, strongly significant manipulation checks supported the null results. Two simpler follow-up studies, designed and conducted to test the effect of cue frequency, also showed few significant results. Griffin, et. al. (1983) concluded with a discussion of the utility of attending to potentially valid null findings, a tabular summary presentation of the extant SIP laboratory studies, and the observation that the primary effects of social cues are less on task perceptions than on affective reactions and occur only when cues are unanimous, salient, and presented in very high frequency and/or number. These conditions are not reflective of most work settings. Hence, either the validity of the SIP framework must be severely questioned, or more convincing demonstrations of SIP effects on responses to work environments must be made via methods that are more realistic and spontaneous that the artificial creation of extremely unnatural communications.

One potentially fruitful avenue toward demonstrating a more natural unfolding of a SIP effect on task responses comes from a long-standing experimental tradition in social psychology. Discussion among members of a task group has been repeatedly shown to induce changes in attitudes, decisions, and other behaviors (cf., Lamm & Myers, 1978). That group interaction results in shifts in peoples' responses appears to be a phenomenon that is reliably replicated in the laboratory as well as representative of many real-world occurrences.

Research into group-induced response shifts was born with the discovery

of the "risky shift," that is, the tendency of groups to reach riskier decisions than the average of the initial individual decisions (Stoner, 1961). Subsequent research uncovered cautious shifts when initial individual tendencies are cautious, and a more general label for the shift, group polarization (Moscovici & Zavalloni, 1969), is now used. As reviewed by Myers and Lamm (1976; Lamm & Myers, 1978), the group polarization effect has been demonstrated across a variety of diverse tasks assessing many dependent variables, including not only decisions about courses of action (the original realm) but also judgments (Billig & Cochrane, 1976), evaluations of other persons (Myers & Lamm, 1976), including hypothetical supervisors (Stephenson & Brotherton, 1975), and numerous attitudes (e.g., Doise, 1969; Moscovici & Zavalloni, 1969). One earlier article (Cummings and Chertkoff, 1971) proposed management implications of the risky shift in organizations.

Typically, group shifts represent an enhancement of the initial prevailing individual tendency. Occasionally, however, a polarization of the initially dominant tendency is not found. Shifts in the opposite direction, or a lack of shift, (e.g., Cvetkovich & Baumgardner, 1973; Myers & Bach, 1974) are explained by the existence and influence of some external norm held by a reference group.

Regardless, though, of the direction of the group shift, the most strongly and consistently supported explanation is one of informational influence (Lamm & Myers, 1978). Arguments that emerge during discussion may not have been initially salient to individuals, and thus contribute to shifts in their post-discussion questionnaire responses.

Given the conceptual overlap between the prevalent theoretical explanation for the oft-replicated group shift and Salancik and Pfeffer's (1978) SIP approach to task design, it seems likely that a merging of these two lines of research has utility for demonstrating social influence effects on employee

responses to their tasks. The present study, in a departure from the general design of experiments reported in the SIP (management) literature, uses the traditional repeated measures design of the group polarization studies in the social psychological literature. This design involves a pretreatment measure, when subjects have no knowledge of the experimental treatment; the treatment, consisting of a group discussion; and a posttreatment administration of the same questionnaire. The posttreatment questionnaire is completed either by all individual subjects or, more commonly, by group consensus. Control groups do not engage in the group discussion treatment. Response shifts are measured in all conditions by changes from the pretest to the posttest.

One characteristic differentiating the present study from the traditional group polarization study is its use of posttest questionnaire administration to each subject, rather than a request for a single group (consensus) decision. Anderson and Graesser (1976) distinguish between the attitude-formation and consensus-formation stages of group decision-making, and suggest that research should focus on group products if decision schemes are being studied, and individual responses if attitude change is being studied. Furthermore, Lamm & Myers (1978) point out that the social and informational dynamics most convincingly invoked as explanations of group shifts are most germane to the attitude-formation stages, whereas other explanations (such as responsibility dynamics) appear most applicable to the consensus stage. Therefore, and consistent with the general thrust of the SIP framework, changes in individual perceptions and affect will be investigated rather than group responses.

Several advantages accrue from the use of this approach. Social cues emanate from genuine coworkers and are more natural and noncontrived than the artifical, planned cues of experimental confederates. Demand characteristics and other sources of artifacts should thus be minimized. In addition, the pre-test/post-test design enables the study of changes in attitudes, thereby

providing a more externally valid representation of the dynamic responses characteristic of employees than static, post-test only designs. Finally, significant shifts after group discussion, coupled with nonsignificant changes in the nondiscussion control conditions, would provide a convincing experimental demonstration of SIP effects on individual responses to tasks.

Method

Design

The study was designed to include two independent variables: group-task type and post-task consideration of the task. There were two levels of each variable: problem-solving vs. clerical group tasks and solitary-introspective vs. group-discussion post-task consideration of the task. Hence, four experimental cells were created. The study thus used a basic 2x2 design. However, for reasons to be explained later, results were analyzed with an alternative approach to analysis of variance.

Dependent variables of interest were individual perceptions of and attitudes toward the task. These measures were collected at two points during the course of the experimental session: immediately after the task and again following the post-task consideration manipulation.

Subjects

Subjects were 110 undergraduates, 61 males and 49 females, enrolled in a junior-level management course at Texas A&M University. Participants received partial course credit for taking part in the experiment.

Subjects participated in mixed-sex groups with a mean size of 4.8 persons. Each group was randomly assigned to one of the four cells in the experimental design.

All sessions were conducted by the same male experimenter.

Manipulations

Group-Task Type. Groups worked at tasks for forty minutes.

In the problem-solving task condition, participants were informed upon arrival that they would work on a group problem solving task. Group members were seated around a table and received identical booklets of task problems. Problems had been selected from "Puzzles for Pleasure"-type books and published Mensa tests. The following problems are representative:

A man moors his boat in a harbor at high tide. A ladder is fastened to the boat, with three rungs showing. The rungs are 12 inches apart. At low tide the water level sinks 20 feet. How many rungs of the ladder are now showing.

Arrange the digits, from 1 to 9, in a square, so that every row, column, and diagonal totals the same amount.

The two volumes of Gibbons' "Decline and Fall of the Roman Empire" stand side by side in order on a bookshelf. A bookworm commences at Page 1 of Volume I and bores his way in a straight line to last page of Volume II. If each cover is 1/8 of an inch thick, and each book without the covers is 2 inches thick, how far does the bookworm travel?

The experimenter emphasized that, while the problems were not all business-oriented per se, the task was useful in developing the team problem-solving skills exhibited by successful practicing managers. The nature of the problems varied: some were conceptual, some mathematical; some were easy, some difficult; some were straightforward, some tricky. Groups were free to devise their own problem solving strategies, e.g., division of labor, unity of effort, or some hybrid; further, since more problems were provided than could be addressed in the forty-minute time limit, groups were free to select which problems they would attempt to solve. The experimenter indicated that he would be available should the group wish to learn if a solution it had reached was right or wrong; if the group sought feedback on any particular problem, it was not free to alter that answer subsequently. The group-nature of the task was emphasized;

groups were instructed to reach a consensus solution for each problem and urged to discuss both insights and stumbling blocks as they arose.

In the clerical task condition, arriving participants were informed that they would work in groups on a "Price Graphing" task. The task was similar to that developed by White and Mitchell (1979) and used later by Griffin, et al. (1983). Group members received similar booklets consisting of 12 pages of New York Stock Exchange quotations. Participants were told that each page represented a random day in twelve different months of a recent calendar year. Market activities of the same approximately-800 stocks appeared on each page; price quotations for each stock differed from page to page throughout each booklet.

Group members were seated around a table. Each received a sheet of graph paper and was instructed to graph the prices of designated stocks throughout the "year", pass the graph to the left (and receive a graph from the right), graph the prices of the next set of designated stocks, and on. After each round the process would begin again; on some rounds, subjects were instructed to pass graphs to the right rather than to the left.

The instructions provided no rationale for the task. Though stocks differed from turn-to-turn, the graphing process itself was invariate. Stocks to be graphed were designated by the experimenter. Except to designate stocks and to direct the passing of the graphs, the experimenter made no comment about task performance. Group members worked on graph sheets sequentially--each member contributed only a fractional share of each completed sheet of graph paper. While conversational interaction was not prohibited, the sequential nature of the task posed limitations.

After the forty minute time limit elapsed, group members for both task correlations were separated and sequestered to individually complete the task perceptions and evaluation measures.

Post-Task Consideration. Eight minutes were allotted for post task consideration. In the group discussion condition, individuals re-assembled as a group and received these general instructions:

> Like questions on a test, the questionnaires you just filled out may have limitations. They may not capture what you know; or, you may not have a quick answer ready; or, you may simply need some time to develop and express your knowledge.

They were then asked to engage in group discussion about the group task (problem solving or price graphing). Every member was urged to participate in discussion. The experimenter remained with the group as a passive observer to encourage discussion of the task in circumstances when conversation wandered from the topic for more than a minute.

In the solitary-introspection condition, participants remained isolated in separate rooms. Individuals received the same general instructions issued in the group-discussion condition. Each subject was then asked to "think about" the group task (problem-solving or price graphing) alone in the room. The experimenter urged each subject not to let thoughts stray far from the topic.

After the passage of the eight minutes allotted for post-task consideration, participants were sequestered individually (in the group discussion condition) or remained sequestered individually (in the solitary-introspection condition) to complete the same task perception measures again. Participants were instructed to let their answers be "guided by the thoughts you have just developed" in the consideration condition. Participants then re-convened as a group for debriefing.

Measures

Measures of individual perceptions of the group task were administered at two points during the experimental session, as described above: immediately subsequent to the task and then following the post-task consideration condition.

Individuals' task perceptions were gauged by 25 seven-point semantic differential items developed by Scott (1967). Each dimension was anchored by constrasting adjective pairs (e.g., the task was "extremely pleasant" to "extremely unpleasant"; "extremely varied" to "extremely routine").

The rationale for not using a standard task attributes measure such as the JDS (Hackman & Oldham, 1975) or JCI (Sims, Szilagyi, & Keller, 1976) stems from the basic assumptions of the SIP viewpoint. As noted earlier, these assumptions suggest that the definition, weighting, and evaluation of relevant task dimensions varies across settings. Hence, rather than impose an a priori framework for assessing tasks, it seemed more appropriate to use a general assessment scheme which could then be translated into specific and relevant task properties.

Results

Factor analysis on the semantic differential scale completed at t_1 revealed an identifiable and useful factor structure. Four factors with eigenvalues greater than 1.0 emerged. The varimax rotated factor matrix is presented in Table 1, including the items with factor loadings of .40 or greater. Sixteen of the original 25 items met this criterion, and were retained for further analysis.

The four factors were labeled, respectively, job challenge, meaningfulness, predictability, and affect. Thus, one factor similar to a generalized satisfaction measure (affect) and three factors more indicative of perceptions of specific task dimensions were revealed. Although the original set of items was chosen and administered by the experimenters, the identification of emergent dimensions via factor analysis helped to provide four dependent variables that were psychologically meaningful and salient to subjects.

Since the four factors were to be used as dependent variables, their

reliabilities were assessed next. Job challenge (Factor I) had internal consistency reliabilities of α =.89 on the pretest (t_1) and α =.90 on the posttest (t_2), with a test-retest reliability of r =.94. Meaningfulness (Factor II) showed α =.84 at t_1 and α =.87 at t_2, and a test-retest reliability of r =.76. Reliabilities of the predictability scale (Factor III) were α =.69 at t_1, α =.75 at t_2, and r =.79 from t_1 to t_2. Finally, affect (Factor IV) showed α =.74 at t_1, α =.70 at t_2, and a test-retest reliability of r =.73. As such, the measures generally had acceptable levels of internal consistency as well as stability.

The primary analytical tests for response shifts in the four experimental conditions were conducted via paired t-tests for differences in subjects' t_1 and t_2 scores within each condition. Although the experimental design is suggestive of an analysis of variance or covariance analytical scheme, the goals of the study dictated correlated t-tests on response changes. In essence, the data of interest lie within cells rather than between conditions. Differences between response shifts in the problem-solving vs. clerical tasks were not at issue, nor was it of central importance to determine whether group discussion conditions in general lead to more response changes than no discussion conditions. Rather, a group shift/social information processing effect would be demonstrated if subjects in the discussion conditions exhibited changes from t_1 to t_2, whereas the no discussion conditions elicited no change. Furthermore, such a pattern, manifested across both the problem-solving and clerical tasks, would suggest a degree of generalizability of the phenomenon across tasks.

Table 2 shows the mean pre-test and post-test scores, and correlated t-tests, in all experimental conditions. With the clerical task, significant response shifts occurred on one of the four dependent variables in the no-discussion condition and on two of four variables in the group discussion condition. With the problem-solving task, group discussion elicited significant shifts in

three variables, versus no shifts in the no discussion condition. All told, response shifts occurred on one of eight dependent variables when there was no group discussion, and on five of eight variables when subjects did discuss their tasks.

Discussion

The pattern of results indicates effects of social information, as exchanged via group discussion, on perceptual and attitudinal reactions to tasks. Designed in response to recent criticisms of previous methodology in SIP laboratory studies, this study drew from the basic method of the risky shift/group polarization tradition in social psychology. In so doing, it not only demonstrated significant effects with an alternative approach to the typical SIP study design of recent years, but also offered several methodological advantages.

First, social cues emanated from naturally occurring group discussion among subjects rather than artificial, unidirectional communication from an experimental confederate. Although the opportunity and stimulus for discussion was provided experimentally, the casual and natural interactive exchange of social information about the task was probably less contrived and less contaminated by demand characteristics than other methods of communicating prepared cues. Additionally, any demand characteristics that may have been created by the provision of time to consider the task and the subsequent (second) questionnaire administration would also have been present for subjects in the control groups. For these subjects, reflection time as opposed to discussion time was provided, and post-test questionnaires were likewise administered. Without group discussion, though, response shifts were generally not in evidence.

Second, the use of a pretest and a posttest provided the first reported measure of perceptual changes as a function of exposure to social information in a laboratory task design context. This reflects an employee's development

of task perceptions, exposure to new information in the form of social cues, and subsequent (potential) response change. Such a process undoubtedly is more representative of most person/task/social system dynamics than static appraisals of passive individual reactions to social cues.

Third, the use of factor analysis to create the dependent variables in this study provided a step toward the identification of constructs having, perhaps, truer psychological meaning to the subjects than experimenter-created and -imposed constructs. Previous SIP studies, save one (O'Connor & Barrett, 1980), have been limited to the use of standard task attributes instruments. Of course, subjects in the present study were still constrained by the array of 25 items upon which the factor analysis was performed. Future research might concentrate on the identification of pertinent task characteristics through the collection of unconstrained responses to open-ended questions.

Finally, the use of two different types of tasks was a departure from the typical use of enriched and unenriched versions of the same basic task. Thus, as aspect of generalizability across tasks was explored. Statistical inference suggested some degree of generality, although the results were much more clear-cut in the problem-solving task than in the clerical task. It may have been that the problem-solving task generated more interaction during the task phase of the study, thereby creating a stronger group which generated a more powerful social influence in the discussion phase.

Two characteristics of the significant response shifts--their direction and their magnitude--require some scrutiny. Subjects started at the positive ends of the scales, and then shifts occurred in the negative directions. Subsequent responses were thus less positive (although not negative). This direction is opposite that predicted by a true group polarization effect, which dictates a shift in the same direction as the initial individual tendencies. Group shifts in the opposite direction are more uncommon, and have been explained

as a response to some external norm contrary to the initial tendencies. In this case, for example, students failing to appreciate the need for or utility of participation in a research project may provide a reference group with a negative normative posture. This possibility does not minimize the demonstration of a group shift, nor the potential generality of the effect to nonlaboratory settings. It does suggest, however, that the direction of the shift in responses to tasks may vary from setting to setting.

The magnitude of the effect, despite statistical significance, was not very substantial. This small but significant effect is consistent with Cartwright's (1971) early review of the risky shift phenomenon and with many other attitude change paradigms. It may be that the act of responding to the pretest was a binding choice that inhibited change. If this was the case, the effect would have been more powerful without the commitment of responses on a pretest, thereby more strongly suggesting a valid phenomenon of practical significance. On the other hand, perhaps statistically significant yet minor changes as a result of processing social information are quite representative of everyday processes.

It may be that a useful description of the process can be extracted from Tversky and Kahneman's (1974) notion of anchoring and adjustment. In making decisions, typically in the form of predictions or estimates, people start from some initial appraisal and adjust on the basis of incoming information. These adjustments are usually insufficient; that is, final estimates are still biased toward the initial starting point. Thus, different starting points are affected by (the same) new information, but final estimates are still different and biased toward initial values.

The same process may operate in the task design realm. Employees develop perceptual and affective reactions to their jobs, as predicted, for example, by the task characteristics model (Hackman & Lawler, 1971; Hackman & Oldham,

1976). Incoming social information is then processed, as predicted by the SIP model (Salancik & Pfeffer, 1978). Finally, the employee adjusts his reactions in a relatively minor yet significant way.

There are several sources of support for the existence of such a process. First, employees no doubt form reactions to tasks independent of social cues. Second, theoretical statements have identified numerous limiting conditions to the SIP effect (e.g., Blau & Katerberg, 1982). Third, studies suggestive of a powerful SIP effect are open to criticism and have been followed by recent null results (Blau, 1983; Griffin, et al, 1983). Fourth, a massive literature on group-induced response shifts (cf. Lamm & Myers, 1978), the results of the present study, and the adjustment and anchoring process identified in a different yet related arena (Tversky & Kahneman, 1974) all point to a small yet significant effect. Future work should pursue the potential validity of this complementary merger of perspectives on employee reactions to task design.

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Table 1. Semantic Differential Item Factor Loadings [1]

Item		Factor			
		I	II	III	IV
3.	complex-simple	.71	-.06	-.56	.34
7.	difficult-easy	.65	-.06	-.51	.34
19.	varied	.77	.09	-.12	.17
23.	broad	.75	.26	-.07	.17
24.	exciting	.47	.20	-.21	.39
11.	valuable	.08	.74	-.03	.15
17.	meaningful	.15	.69	.06	.19
21.	important	.09	.90	.09	.07
22.	positive	.13	.53	.15	.45
10.	explicit-vague	-.14	.16	.65	.05
12.	clear	-.09	-.03	.75	.09
18.	secure	-.14	.05	.46	.01
4.	pleasant-unpleasant	.21	.14	.06	.54
6.	bright-dark	.21	-.03	-.16	.55
9.	attractive-unattractive	.12	.16	.05	.56
14.	wholesome	.09	.17	.11	.56

1 Only items with loadings greater than .40 were retained.

Table 2. Initial and Final Scores and Paired t-tests for Changes in the Dependent Variables in the Four Experimental Conditions

Clerical Task

Experimental Condition	N	Dependent Variable	Initial Score	Final Score	t
No Discussion	28	1. Challenge	25.8	27.4	-2.98**
		2. Meaningfulness	14.9	16.2	-1.80
		3. Predictability	8.3	9.2	-2.01
		4. Affect	18.9	19.7	-1.46
Group Discussion	28	1. Challenge	27.6	28.4	-1.24
		2. Meaningfulness	15.1	16.5	-2.98**
		3. Predictability	7.8	8.3	-1.10
		4. Affect	18.2	19.2	-2.58*

Problem-Solving Task

Experimental Condition	N	Dependent Variable	Initial Score	Final Score	t
No Discussion	26	1.. Challenge	14.5	14.6	-0.09
		2. Meaningfulness	13.7	13.1	1.22
		3. Predictability	11.0	10.8	0.96
		4. Affect	17.0	16.6	0.87
Group Discussion	28	1. Challenge	13.3	14.4	-3.13**
		2. Meaningfulness	14.7	14.5	0.45
		3. Predictability	10.8	11.6	-2.35*
		4. Affect	16.1	16.9	-2.82**

* $p < .05$.

** $p < .01$.

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