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T C HEAD ET AL. APR 85 TR-ONR-DG-14 N00014-83-C-0025

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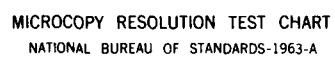
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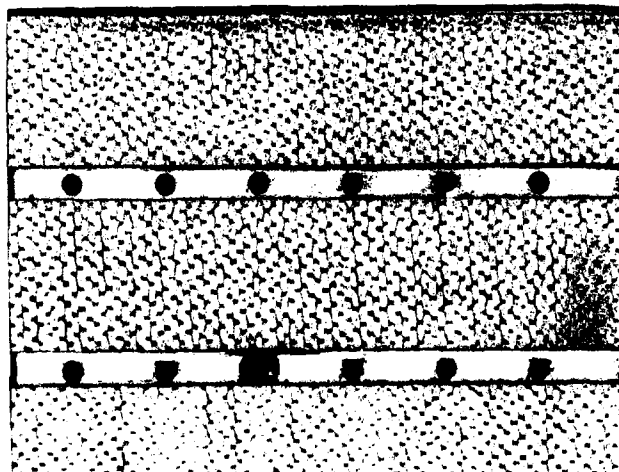
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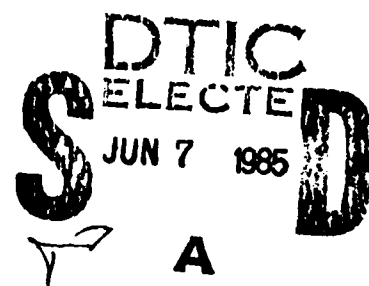
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Richard Daft
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The Priming Effect in Task
Design Research

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TR-ONR-DG-14

April 1985

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N00014-83-C-0025
NR 170-950

Organizations as Information Processing Systems

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1. REPORT NUMBER TR-ONR-DG-14	2. GOVT ACCESSION NO. AD-A154589	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) The Priming Effect in Task Design Research	5. TYPE OF REPORT & PERIOD COVERED Technical Report	
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Thomas C. Head, Valerie L. Yates, Ricky W. Griffin, and Thomas S. Bateman		8. CONTRACT OR GRANT NUMBER(s) N00014-83-C-0025
9. PERFORMING ORGANIZATION NAME AND ADDRESS College of Business Administration Texas A&M University College Station, TX 77843		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR170-950
11. CONTROLLING OFFICE NAME AND ADDRESS Organizational Effectiveness Research Programs Office of Naval Research Arlington, VA 22217		12. REPORT DATE April 1985
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approval for public release: distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study, using a different operationalization than previous work, investigated the potential impact of the priming effect on task design research. The priming effect, as discussed by Salancik and Pfeffer (1977, 1978), is artificially increasing an attitude's saliency by including items describing that attitude on a questionnaire. Results of the study demonstrated a strong presence of priming effects. However, further analyses of how the priming effect may manifest itself in common descriptive statistics (means, correlations, reliabilities) provided mixed findings.		

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The Priming Effect In Task Design Research

Abstract

✓ This study, using a different operationalization from previous work, investigated the potential impact of the priming effect on task design research. The priming effect, as discussed by Salancik and Pfeffer (1977, 1978), is artificially increasing an attitude's saliency by including items describing that attitude on a questionnaire. Results of the study demonstrated a strong presence of priming effects. Further analyses of how the priming effect may manifest itself in common descriptive statistics (means, correlations, reliabilities) provided mixed findings.

*Additional keywords: operations research;
simulation; A*

The Priming Effect In Task Design Research

A heated debate (Stone and Gueutal, 1984; Salancik, 1984; Stone, 1984) centering on the validity of the priming effect as a concern in need satisfaction research recently appeared in the Journal of Management. The purpose of this paper is to describe the central points of that debate, and to present the results of a study testing for the effects of priming. The study utilizes a somewhat different operationalization of the priming effect than has been used in previous research.

The priming effect was first proposed by Salancik and Pfeffer (1977) as one of a variety of artifacts that may have an impact on survey measures. The concept was more thoroughly defined and its potential problems more completely explicated by Pfeffer and Salancik (1978). The priming phenomenon, as they describe it, suggests that by simply measuring an attitude, the researcher could make that attitude more salient, or possibly even create an attitude that did not previously exist. That is, by simply supplying the individual with a questionnaire covering specific topics, the researcher may be creating a conception of reality in the mind of the individual that includes phenomena that were not previously present.

Herzberg (1964) recognized this possibility when he explained his controversial research methodology. In developing a scale, researchers "...are only satisfying [a] penchant for rulers which do not get inside the experience and measure the phenomenological reality, but rather have significance wholly within [the] devices." (Page 4). One of the three principle difficulties of measuring attitudes identified by

Herzberg is similar to the priming effect. Specifically, people often respond to questions just for the sake of responding, even on topics about which they have no clear attitude, or have never even thought about.

Further support for the priming effect comes from a discussion by Webb, Campbell, Schwartz and Sechrist (1966). They discussed the possibility that the process of measurement may itself create attitudes through what they termed the preamble effect. The preamble effect is altering an individual's attitude through the questions asked. They note in particular:

Research by Roper (cited by Crespi, 1948) shows that the well established 'preamble effect' (Cantril, 1944) is not merely a technical flaw in determining the response to the question at hand, but that it also creates attitudes which persist and which are measurable on subsequent unbiased questions. Crespi reports additional research of his own confirming that even for those who initially say 'don't know' processes leading to opinion development are initiated." (Pg 18).

Recent Debate

Stone and Gueutal (1984) performed a lab study to test for the priming effect in the responses of 165 students who had constructed models of molecules. The major contention of the authors was that if priming, or the making of certain factors more salient to an individual, was a valid artifact, it would manifest itself in differential responses based upon the sequential ordering of activities. These activities were embedded in the task itself, as well as the process of the separate completion of the four major sections of the Job Diagnostic Survey, or JDS (Hackman and Oldham, 1975).

Subjects were randomly assigned to four conditions in which the sections of the questionnaire were completed in different sequences.

Stone and Gueutal found no significant differences in the degree of correlations among the various variables based upon the ordering of the measures. They also failed to find strong support for the notion that the mean levels of the variables would be influenced by their order. However, strong differences were found in the estimated reliability levels in two of the variables, skill variety and task identity.

Stone and Gueutal cited a study by Brief and Aldag (1977) in which 157 registered nurses were surveyed on role stress, job satisfaction, growth need strength, job characteristics and job facet satisfactions. The effect of the different ordering of the instruments was not found to be too pervasive. However, the researchers did find generally inconsistent differences of small to moderate size in the reliabilities of the measures. Combining the results of the two studies, Stone and Gueutal concluded that the priming artifact is not a serious concern when conducting research on need satisfaction models.

In a direct reply to Stone and Gueutal, Salancik (1984) stated that Stone and Gueutal's theoretical base for assuming any effects due to differential ordering was erroneous. In particular, "ordering effects...have no bearing on the issue of priming..." (Pg 250). Salancik went on to make reference to his original article (Salancik and Pfeffer, 1977) in which the authors wrote "...there is no general relationship between order of questions and priming or consistency effects on questionnaire responses," (Pg 251). Salancik also noted that effects due to ordering could only be attributed to priming if two conditions were met: "Responses to Item A are more salient...when Item A precedes Item B, and the extent to which A implies B is more salient and credible than the extent to which B implies A," (Pg 252).

Salancik argued that these two relationships cannot be generally considered valid. Salancik further stated that the Stone and Gueutal study did not meet these conditions, and thus there was no logical reason for expecting priming effects to emerge. This basic theoretical weakness in Stone and Gueutal's design was further complicated by the fact that not two, but five 'items', or survey sections, were involved. This resulted in 36 possible orderings, of which only four were included in their study. Therefore, Stone and Gueutal did not have the ability to test for the priming effect.

Stone (1984) defended his study from Salancik's criticism by stating that the theoretical base they used was the accepted principle that "...if measurement of behaviors (e.g., descriptions of job activities) precedes the measurement of attitudes (e.g. job satisfaction), then behavior-attitude correlations should be greater than when the reverse ordering is used" (pg 255). He also pointed out that this was the identical assumption made by Salancik (Salancik & Calder, 1974) in a study involving religious behaviors and attitudes toward religion. Stone added that if one were to accept Salancik's ideas, research in need-satisfaction models would be impossible, for the scientist could never be sure that any measurements obtained were not actually results of the priming effect. A final conclusion of Stone's was that if Salancik's criticisms of the Stone and Gueutal study were valid, it would be impossible to demonstrate the operation of priming.

There are several inaccuracies in Stone's defense. One problem was that in the Stone and Gueutal study, only attitudes were measured. Perceptions of core job dimensions cannot be considered behaviors.

Stone was also incorrect in concluding that the operationalization of priming was impossible. As noted earlier, Webb et al. (1966) cited two empirical studies that indirectly support the concept of priming. Additional empirical support is presented by Trice and Belasco (1968). This study involved the evaluation of a supervisory training program on the detection of alcoholic employees. They found that just by issuing a pre-test questionnaire, control subjects had their behaviors and attitudes changed to the same extent as those who had received the training. One conclusion was that surveys could serve a functional role, "by sensitizing the trainee to important information, or by raising doubts and anxieties which create a readiness to seek additional information...". (Pg 4).

The Present Study

The study reported in this paper uses a different methodology than did Stone and Gueutal (1984) to examine the validity of the priming effect. Instead of examining for manifestations of the effect through the ordering of several different measures, this study tested whether the administration of the JDS makes more salient those attitudes that are included in the survey. Subjects either completed the JDS and then responded to an open-ended question about their job, or completed the JDS after responding to the open-ended question. If the priming effect does exist, then the responses to the open-ended question would differ according to its position relative to the JDS.

Three additional analyses were conducted. These were performed not as direct tests of the priming effect but to facilitate comparisons with the Stone and Gueutal results. They pertain to how the priming

effect might manifest itself in different statistical procedures. Specifically, these additional tests were made for differences in: (1) reliabilities of the five core dimensions, (2) mean scores on the five core dimensions, and (3) intercorrelations among the core dimension. Results from these analyses, while not directly relevant to the existence of the priming effect, could provide insight as to the possible statistical impact of the effect.

Methodology

Overview

Groups of four or five subjects participated in a simulation exercise intended to reflect realistic work-related activities. Subjects were randomly assigned roles in a hypothetical organization; their roles modeled various management-level positions. After the simulation, the subjects either responded to an open-ended question followed by completing part of the JDS, or vice versa.

Subjects

The subjects were 157 undergraduate students at a large southwestern university. The subjects were enrolled in an introductory management course. Participation in a laboratory experiment was a course requirement.

Procedure

Subjects reported to a behavioral laboratory in groups of 4 or 5. They were told that they would be playing the roles of managers within

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Table 5

Correlation Matrices Comparison

	Total	Open Response First	JDS First	Z-Score
SV, TI	.04	-.05	.23	-3.46***
SV, TS	.25	.21	.30	-1.18
SV, AU	.41	.43	.38	.73
SV, JF	.20	.22	.17	.63
TI, TS	.08	.12	.06	.74
TI, AU	.02	-.09	.26	-4.34***
TI, JF	.23	.29	.17	1.55
TS, AU	.50	.53	.45	.11
TS, JF	.40	.55	.11	6.30***
AU, JF	.39	.36	.42	-.87
n	149	85	64	

***: $p \leq .01$

SV=Skill Variety

TI=Task Identity

TS=Task Significance

AU=Autonomy

JF=Job Feedback

Table 3

Reliability Comparisons

	Total	Open-Response	JDS First	Z
Skill Variety	.72	.74	.68	1.42
Task Identity	.76	.78	.70	2.09**
Task Significance	.67	.74	.57	3.55***
Autonomy	.26	.17	.36	-2.41**
Job Feedback	.75	.82	.60	5.46***
n	143	79	64	

***p $\leq$.01**p $\leq$.05

Table 4

MANOVA of Means

	<u>Open Response First</u>		<u>JDS First</u>	
	x	s	x	s
Skill Variety	4.75	1.28	4.90	1.14
Task Identity	4.24	1.54	3.68	1.40**
Task Significance	5.83	1.05	5.95	.97
Autonomy	4.76	.88	5.02	.79*
Job Feedback	4.81	1.35	5.01	1.04
n	85		64	

*:p $\leq$.1**:p $\leq$.05

F = 1.906 (p = .097)

Table 1

Results of the Content Analysis

Dimension Identified	Open Response First		JDS First	
	Freq.	%	Freq.	%
Interacting With Others Inside Organization	36	53	52	58
Responsibility	31	46	48	54
Authority	16	18	31	35
Autonomy	39	57	24	27
Work Load	0	0	16	18
Communication	6	9	11	12
Use of Special Skills	14	21	11	12
Task Variety	17	25	10	11
Affect Related To Work	8	12	8	9
Significance	15	22	6	7
Financial Needs	0	0	5	6
Interacting With Others Outside Organization	5	7	5	6
Position in Hierarchy	0	0	4	4
Organization Goals and Policies	0	0	3	3
Feedback	5	7	1	1
Task Identity	5	7	1	1
	n=68		n=89	

Chi-square=45.84 ($p \leq .005$)

Table 2

	JDS First	Open First
JDS Dimensions	81	42
Non JDS Dimensions	116	194

Chi-square=30.41 ($p \leq .001$)

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Gueutal (1984), are inappropriate, for they may 'mask' the actual existence of the priming effect. Finally, the body of knowledge revolving around need satisfaction models, and in particular JDS studies, should be reevaluated to take into consideration the possible contaminating impact of the priming phenomenon.

true priming differences might be ignored or 'masked' over.

Another problem with looking only for statistical manifestations is the issue of causality. It is impossible to determine whether it was the priming or some other confounding variable which resulted in the significant differences. One alternative explanation is that by allowing individuals to either respond to an open-ended question (or complete other surveys first), the individual has additional time to develop a cognitive structure to use in processing his or her attitudes related to the job. Taken in this context, four of the five reliabilities increased (three significantly,) when the individual was allowed additional time to think about the job just performed.

There are, of course, limitations in the design of this study which must be considered in attempting to interpret and/or generalize these results. The principle limitation is that this was a laboratory study which has all the threats to external validity inherent in such a method. The subjects used were college students and the task was a management simulation, bringing to surface the possible problems of lack of true task involvement and/or characterization of actual attitudes. Therefore, it is unclear to what extent these results might generalize to actual behaviors and attitudes in organizational settings.

These design limitations aside, there are three interesting implications that can be drawn from this study. First, these supportive results of the priming effect indicate that field research on this phenomenon is needed. Second, in future tests for the priming effect, designs which utilize solely differential ordering and statistical manifestation, such as Brief and Aldag (1977) and Stone and

frequency, and three of the four greatest differences involved the core dimensions. The JDS also appeared to restrict the range of responses when it was completed first, in that there were 25% fewer dimensions identified by the persons who completed the JDS before responding to the open format question.

The statistical effects were very similar to Stone and Gueutal's (1984) results. While they are not actually direct tests of priming, they are tests of how the effect might manifest itself. These tests provided mixed support for priming. The reliabilities of four of the five core dimensions were significantly different between conditions. For three of the dimensions, responding to one questionnaire first increased the reliabilities. A second analysis, a MANOVA, found significant differences ($p < .10$) between the conditions in two of the core dimensions. The third analysis involving the correlation matrix was inconclusive, in that only three of 10 correlations were significantly different and these could very well have been statistical artifacts. Therefore, while the existence of a priming effect was strongly supported by the results of this study, the statistical manifestations were fairly weak.

This pattern of results raises a central issue in the operationalization of the artifact. By examining for a priming effect through how it differentially affects statistical properties, as did Stone and Gueutal, one could possibly conclude erroneously that priming had no impact. This study found few significant differences in statistical properties, aside from the reliabilities, between the two groups, even with the liberal ($p = .1$) significance level. Thus, by limiting oneself to the statistical manifestations of the phenomenon,

conditions and these are most likely statistical artifacts. The correlation of Task Identity/Autonomy is meaningless in light of the very low reliability of the Autonomy dimension ($\alpha=.26$). The other two correlations contain at least one variable that had significantly different reliabilities across conditions. The differences obtained in the three correlations are most likely artifacts of these reliability differences.

Discussion

There were two purposes to this study. The first was to test for the existence of the priming effect on a commonly used instrument in task design research, the Job Diagnostic Survey. The second purpose was to examine possible ways that the priming effect might manifest itself in the use of different statistical procedures.

The priming effect is making an attitude or concept more salient to the individual by referring to it on a questionnaire. The one previous test of this effect (Stone & Gueutal, 1984) found very little evidence of priming. However, they had simply manipulated the ordering of different survey sections, a design which has no true theoretical base, and which is possibly even 'anti-theoretical' (Salancik, 1984).

This present study, through a different operationalization, found strong support for the existence of the priming effect. Subjects were randomly assigned to one of two groups: JDS first or open-ended response first. The responses to the open-ended questions were content analyzed and the two groups compared. A Chi-square test for independence was significant, indicating that the frequency with which dimensions were identified was dependent upon the condition. In the JDS first condition, all five core dimensions showed increases in

open-ended responses came first.

The reliability comparisons also resulted in significant differences between conditions (see Table 3). Z-tests of the transformed correlation coefficients indicate that four of the five core dimensions (task identity, task significance, autonomy and job feedback) are significantly different ($p \leq .05$) based upon condition. This supports the results obtained by Brief and Aldag (1977) and Stone and Gueutal (1984). In three of the core dimensions (Task Identity, Task Significance and Feedback from the Job) the reliability significantly increased when the subject responded to the open ended question before completing the JDS.

The MANOVA results on the mean scores compared by condition are found in Table 4. The overall F-score was marginally significant ($p = .097$). This is a different finding from the Stone and Gueutal (1984) study in which the MANOVA failed to reach significance at $p \leq .10$. Further analysis indicated that two of the five core dimensions, (task identity, $p = .018$, and autonomy, $p = .076$) had significant differences. The dimension of task identity increased (3.68 to 4.24) from the JDS first to the open response first format. Autonomy was affected in the reverse way, dropping (5.02 to 4.76) when the JDS was administered after the open response.

The results of the fourth analysis concerning possible differences in the core dimension correlations are in Table 5. These results were similar to the Stone and Gueutal (1984) study in that there is little, if any, support for the priming effect. Only 3 of the 10 correlations (Skill Variety/Task Identity; Task Identity/Autonomy; Task Significance/Job Feedback) had significant differences between the two

Table 2 accentuates the marked difference between the two groups. This table presents the open-ended responses collapsed into two categories: The total frequency of which JDS Dimensions were reported and the total frequency of non JDS dimensions. The chi-square is again significant ($\chi^2 = 30.41$, $p < .001$), and the differences are very clear. In the open response first condition the JDS dimensions were identified a total of 42 times, while in the JDS first condition the same dimensions were reported almost twice as frequently (81). This difference is striking when it is compared to the fact that the open response first combined total is almost 20% (19.8) greater than the JDS first total.

In examining specific dimension differences, the priming effect received additional support. As can be seen in Table 1, three of the four largest differences between the conditions were related to core dimensions. Autonomy, for example, was identified by 57% of those subjects who responded to the JDS first, but by only 27% of those who had not yet seen the JDS. This was the single greatest difference which was observed. Task significance had the third largest difference in frequency between conditions, while variety also reflected a substantial differences.

The second greatest difference between the groups was with the dimension of work load. Eighteen percent of the individuals who responded first to the open-ended question mentioned this dimension, but it was not identified by a single individual in the JDS first condition. Three other dimensions that were included in the open response group were not mentioned in the JDS first condition. This is an increase of 25% in total number of dimensions identified when

probability of incorrectly rejecting the null hypothesis, insuring that one makes a conservative conclusion. However, in this case where the desired result (no artifact due to priming) would be not rejecting the null hypothesis, it is actually conservative to adopt the low alpha level.

Results

The principle test for the priming effect was contained in the content analysis of the open-ended responses. This analysis was performed by two of the researchers, working independently, to identify categories, or dimensions, which were mentioned in the subject responses. The inter-rater agreement (corrected for semantic differences, e.g., Rater 1: 'Use of special skills', Rater 2: ('Technical skills') was .75. Several of the differences between raters dealt with the degree of specificity (e.g., Rater 1: 'Working with people', Rater 2: 'Interacting with others inside the organization, Interacting with others outside the organization'.) If these additional differences are taken into consideration, the inter-rater agreement was increased to .90.

Dimensions identified by just one researcher were discarded and frequencies were obtained for each remaining dimension. A Chi-square test for independence was performed next. The results of these analyses are summarized in Table 1. The priming effect received strong support. The Chi-square of 45.84 was significant at $p \leq .005$. The frequency of which dimensions were mentioned by subjects was dependent upon whether or not the open-ended responses were made before or after responding to the JDS.

with a median of .72, and there is reasonable evidence that it does discriminate among different jobs (Miner, 1980). It is the same instrument that Stone and Gueutal (1984) used in their study. However, in the present study, the sections of the instrument designed to measure critical psychological states, growth need strength, and satisfaction were omitted.

As described earlier, the study tested for the priming effect and its potential impact through at four different procedures. The first, which is the actual test of priming, was a content analysis of the open ended responses. This was conducted separately and blindly by two of the experimenters. The raters identified and sorted the various statements into categories. Following a test of inter-rater reliability, a Chi-square test for dependence was performed.

The remaining three analyses, while not priming effect tests per se, reflected possible manifestations of the effect on typical statistical analyses performed with JDS data. The specific analyses performed in this study were identical to those used by Brief and Aldag (1977) and Stone and Gueutal (1984). First, the Alpha value for each scale was compared for each of the five core dimensions through r to z' transformations. The next analysis was a MANOVA of the five core dimensions, to test for possible mean differences in the dimensions. The final analysis was to examine for possible differences in the correlation matrices, again utilizing the r to z' transformation.

To determine statistical significance, $p \leq .10$ was used. This was the same significance level utilized by Stone and Gueutal. Because the priming effect is a potential contaminant to empirical results, it is logical to use a low alpha level. The alpha level indicates the

a large company. They were then randomly assigned roles by the experimenter using a double blind technique. The subjects read information sheets describing the company, its structure, and their own role. The task they were to perform was an in-basket type exercise developed specifically for this study. The exercise also required some interaction with subjects or an experimenter playing different management levels. The subjects were placed in separate 'offices' and started to work.

The simulation lasted about one hour. Just before the end of the simulation, the experimenter tossed a coin to determine the experimental condition in which the group would be placed. At the end of the hour the subjects were brought together. They were then asked to complete sections one and two of the JDS and to respond to the following statement: "Describe your job. In particular, what aspects of the job did you like, and which aspects didn't you like?" Depending upon the condition in which they were placed, either the JDS was completed first, immediately followed by the open-ended question, or just the reverse, with the open-ended question being first. Regardless of condition, the respondents were unaware of the second measure until they had completed the first measure.

Measures and Analyses

The Job Diagnostic Survey (Hackman, & Oldham, 1975) is one of the most commonly used instruments to assess employee perceptions of the five core dimensions of skill variety, task identity, task significance, autonomy, and feedback from the job. These measures are obtained from sections one and two of the survey. The instrument has reported reliabilities for individual scales ranging from .56 to .88,

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