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An Evaluation of the Response Format and Scale Structure of the Job Diagnostic Survey

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This research deals with an investigation of the factor structure of the Job Diagnostic Survey. Textile operatives (n = *114*) *in a southeastern textile plant completed the JDS. Factor analyses produced substantially different results than have appeared in the literature. Further correlational analyses revealed that the format used in collecting the data may be partially responsible for the different factor structures which have been found for the various types of workers. The researchers conclude that a simplification of the format may be needed.*

INTRODUCTION

The Job Diagnostic Survey (JDS) as developed by Hackman and Oldham (1975) is based on a specific theory of how jobs affect employee motivation. The present form of the JDS is the result of three major revisions, and is intended to be useful in both the diagnosis of jobs prior to redesign, as well as in post redesign research and evaluation. Furthermore, the JDS is

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specifically designed to measure the perceptions of the characteristics of work, as well as the personal affective reactions of individuals to their work. According to its underlying theory, these aspects are said to be indicative of the readiness of individuals to respond positively to "enriched" jobs.

In developing the JDS and in its initial administration, Hackman and Oldham (1975) reported between-scale median correlations ranging from .12 to .28, and internal consistency estimates of .56 to .88. These data were accepted as evidence of the multidimensionality of the JDS. The factorial structure of the JDS was not investigated. Subsequently, Dunham (1976) factor-analyzed the task-dimension items of the JDS for a sample of 3,610 exempt personnel. Although four factors could be identified, Dunham suggested that the most parsimonious representation would be a single dimension called "job complexity." In the most extensive factor analysis study of the JDS items, Dunham, Aldag, and Brief (1977) examined 20 samples of workers (n = 5,945). Through factor analysis, they identified 2-, 3-, 4-, and 5-factor solutions for the various samples. However, the usually assumed a priori structure was reproduced in only 2 of 20 cases. This prompted the strong suggestion that other users should examine the dimensionality tapped by the JDS for each and every sample.

A review of the job redesign literature reveals that there is a specific lack of research dealing with the dimensionality of the JDS as administered to manufacturing operatives. Only 131 of the 5,945 workers in the Dunham et al. (1977) study were manufacturing employees at the operative level. One may argue that there is a need for more research on the dimensionality of the JDS with this type of employee. This argument is based on the following. The JDS is a convenient instrument to use. It has already been labeled as "the most commonly used instrument to assess perceived task design" (Dunham et al., 1977). In addition, there appears to be an increasing number of experiments being conducted with manufacturing employees at the operative level. For example, the American Center for Quality of Work Life is conducting experiments with manufacturing operatives in a variety of settings (Lawler, Seashore, & Strauss, 1977). This interest in the operative-level worker is probably partially due to the perceived need for job redesign. Thus, measurement of job dimensions in this context is necessary. In short, it appears that because of its accessibility and popularity, the JDS has a good chance of becoming more frequently used with manufacturing operatives.

The present study was initially an attempt to provide further evidence of the dimensionality of the JDS using manufacturing operatives. Specifically, this research dealt with operative employees in a textile manufacturing company. However, more importantly, the inspection of the internal

structure of the JDS with the textile workers suggested an hypothesis to help explain the conflicting factor structures found with different types of employees.

METHOD

The subjects were 114 employees, 56 males and 58 females, randomly selected from a rural southeastern textile mill. They had either production or production-support jobs, including weaver, card tender, spinner, doffer, and mechanic. Approximately an equal number of the employees earned incentive wages (n = 61) and hourly wages (n = 53). The mean age of the employees was 38.7 years old and the mean educational attainment was 9.8 years.

The employees were released from work by appointment to participate in the study. They were seated in groups of four to eight in a modestly furnished room located well away from the work area. All workers were informed of the general nature of the study and given the option of not participating. It was stressed that no attempt would be made by the employing organization to identify them. All employees indicated their willingness to participate by signing a consent statement. They then completed the entire JDS (Hackman & Oldham, 1975) and placed it into a locked box.

A single researcher administered the JDS to all 114 workers over a 2-day period. The questionnaire took from 30 to 60 minutes to complete. Although no frequency count was taken of the number of questions asked, the subjects appeared to have some difficulty with understanding the JDS item content.

The job characteristic items of the JDS were factor-analyzed to determine if the dimensionality suggested by Hackman and Oldham (1975) would emerge with the production-type employees. These proposed dimensions were the following: (1) skill variety, (2) task identity, (3) task significance, (4) autonomy, and (5) feedback from the job. To help explain the derived factor structure, further correlational analyses were performed.

RESULTS AND DISCUSSION

A 15 by 15 correlation matrix of the JDS task-dimension items was computed. A principal-factors solution with squared multiple correlations as communality estimates was then used. Only the first six factors had eigenvalues greater than 1.0 (Guttman, 1955). The scree test (Cattell, 1966) pointed towards the extraction of three factors. The three factors from the

Table I. Four-Factor Varimax Rotated Solution of the 15 Task-Dimension Items of the Job Diagnostic Survey ($N = 114$)

Item number	Item content	Factors 1	2	3	4
2	Autonomy	.03	.04	*.55*	.18
3	Task identity	*.41*	−.07	.11	.04
4	Variety	*.45*	−.09	.12	−.01
5	Task significance	*.29*	.07	.03	−.07
7	Feedback	*.34*	.26	.03	−.22
9	Variety	*.45*	−.18	−.03	.10
11	Task identity	.01	−.01	.00	*.66*
12	Feedback	−.01	.20	*.42*	−.14
13	Variety	*.43*	.10	*−.35*	.09
16	Task significance	.15	−.05	*.29*	*−.39*
17	Autonomy	−.02	*.29*	.18	*.38*
19	Task identity	.12	*−.41*	.08	*.34*
20	Feedback	.01	*.54*	−.00	.14
21	Autonomy	−.04	−.19	*.50*	.01
22	Task significance	.10	*.50*	.04	.07

three-factor rotated solution had a similar pattern to three of the four factors from the four-factor rotated solution. Therefore, four factors were extracted and rotated by the varimax and direct oblimin procedures. Since the two solutions differed only slightly, the varimax rotated solution is presented in Table I for simplicity (Gorsuch, 1974).

The a priori dimensions of Hackman and Oldham (1975) were not supported. The three highest loadings on Factor 1 were concerned with skill variety. However, the three highest loadings on Factor 2 were items associated with feedback, task identity, and task significance. Factor 3 had high loadings on autonomy, feedback, and skill variety. Finally, Factor 4 had its highest loadings on task identity, task significance, and autonomy. It should be noted that a five-factor solution produced as poor a replication of the Hackman and Oldham dimensions.

These results did confirm the findings of Dunham et al. (1977) that the factor structure of the JDS is highly dependent on the idiosyncratic characteristics of the respondents. This point is made particularly clear by the differences in factor structure of the production-type operatives in the Dunham et al. (1977) and the present study. They also extracted four factors, but three of their factors did conform to the a priori dimensions of feedback, skill variety, and task significance. Their fourth factor had high loadings on one autonomy and three identity items.

The inability of researchers to confirm the dimensions suggested by Hackman and Oldham (1975) is baffling in that the content of the items within scales appears so similar. However, the first five items, one from each of the scales, do have a different response format in comparison to the last ten items. An example of a task identity item from the first section is provided below.

> To what extent does your job involve doing a *"whole" and identifiable piece of work?* That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small *part* of the overall piece of work, which is finished by other people or by automatic machines?

1	2	3	4	5	6	7
My job is only a tiny part of the overall piece of work; the results of my activities cannot be seen in the final product or service.		My job is a moderate-sized "chunk" of the overall piece of work; my own contribution can be seen in the final outcome.			My job involves doing the whole piece of work from start to finish; the results of my activities are easily seen in the final product or service.	

This format is much more complex than the items in the second section, for example,

> The job is arranged so that I do *not* have the chance to do an entire piece of work from beginning to end.

1	2	3	4	5	6	7
Very inaccurate	Mostly inaccurate	Slightly inaccurate	Uncertain	Slightly accurate	Mostly accurate	Very accurate

A reinspection of Table I showed that four of the five items on the first section had factor loadings of .29 or greater on the first factor. This result suggested that perhaps the method of obtaining the information interfered with identifying the content dimensions. To further investigate this hypothesis, two types of correlations were calculated.

Pearson-product moment correlations were computed between each item and the remaining items of its respective content scale. For example, the composite variable for variety consists of item numbers 4, 9, and 13. Correlations were computed between each of the three items and its content composite of the remaining two items. This composite is referred to as the "content composite." Correlations were also computed between each item and the remaining items of its respective method section, the "section composite." These correlations are presented in Table II.

One would expect the correlation between each item and its content composite to be higher than the correlation between each item and its section composite. In fact, the correlations between each item from section one and its content composite were lower than the correlations between each

Table II. Correlation Coefficients between Job Diagnostic Survey Items and Their Respective Content and Section Composite Variables

Item number	Item content	Questionnaire section number	Correlation between item and its content composite variable (within "scale")	Correlation between item and its section composite variable (within "method")[a]
2	Autonomy	1	.32	.29
3	Task identity	1	.21	.46[b]
4	Variety	1	.41	.49
5	Task significance	1	.18	.36[c]
7	Feedback	1	.20	.32[b]
9	Variety	2	.44	.26
11	Task identity	2	.13	.00
12	Feedback	2	.26	.15
13	Variety	2	.35	.15
16	Task significance	2	.11	.08
17	Autonomy	2	.11	.32[b]
19	Task identity	2	.18	.03
20	Feedback	2	.26	.12
21	Autonomy	2	.28[b]	−.02
22	Task significance	2	.15	.54[c]

[a] Correlation coefficients marked by superscript letters indicate that a two-tailed z test computed for the difference between paired correlations was found to be statistically significant at the designated level of significance.
[b] $p < .05$.
[c] $p < .01$.

item from section one and its section composite for four of the five items. A z statistic was computed on these pairs of correlations, and three of the five pairs were found to be significantly different (see Table II). This result appears to strengthen the argument that the "method" variance is more significant than the "content" variance.

For section two, the expected pattern of correlations held for 8 of the 10 cases remaining. However, for the two cases (i.e., autonomy and task significance) in which the correlation between the item and section composite was opposite to the expected pattern, the z statistic indicated a significant difference (see Table II).

One possible explanation for these two differences may be due to the lack of understanding of the wording of the item. For example, the last item in section two on task significance is as follows:

> The job itself is *not* very significant or important in the broader scheme of things.

It is quite possible that the respondents were not sure of the meaning of "the broader scheme of things." The companion item on the other hand is as follows:

The job is one where a lot of other people can be affected by how well the work gets done.

This item appears to be more easily understood than the item using "the broader scheme of things."

In summary, 6 of the 15 items failed this rather weak test of the meaningfulness of the content scales. And, one may argue that it supports the conclusion that the format of the items may be a confounding factor in interpreting results in an applied setting.

If the format in collecting the data does have an effect, this may be a partial explanation for the different factor structures which have been found for the various types of workers. Different types of employees have different reading comprehension ability and different attentiveness to questionnaires. The production-type worker is likely to be comparatively low in both these respects. The present results suggested that the respondents may not have been reading the rather complex items in section one thoroughly, and may have been responding to all those items in a similar fashion. Other workers may read all the items very carefully and respond to the content appropriately. Under these circumstances, the factor structure may even conform to that suggested by Hackman and Oldham (1975).

The argument was presented above that manufacturing jobs at the operative level may become the future focus of job redesign research. Because of its popularity and its accessibility, the JDS has a good chance of becoming more frequently used. The value of this research is to point out that the JDS in its present form may not be appropriate for use with manufacturing operatives, a population which could particularly benefit from job redesign. Some further revision of the JDS, such as simplification of format, may be needed so that the instrument can satisfy its intended purpose of diagnosis and evaluation.

An instrument referred to as the Job Characteristics Inventory (JCI) has been developed by Sims, Szilagyi, and Keller (1976). The response format for all items on the JCI is the simpler 5-point Likert scale. The subjects used in the initial test of the instrument consisted of two samples. One was paramedical and support personnel employed at a medical center; the other was managers and supervisors in a firm manufacturing petroleum-related equipment. The researchers concluded that the JCI appears "to have validity and reliability characteristics acceptable for research on the relationship between job characteristics and employee attitudes and behavior" (Sims et al., 1976, p. 210).

Pierce and Dunham (1978) have compared the JCI and the JDS using 155 employees of an insurance company. The findings revealed that the JCI was superior (in terms of internal consistency and empirical dimensionality) to the JDS. These researchers concluded that at least part of the reason for

the superiority may be due to the simplified response format. It now remains to be seen whether or not the JCI is appropriate for diagnostic and evaluation purposes with operative level jobs.

REFERENCES

CATTELL, R. B. The scree test for the number of factors. *Multivariate Behavioral Research,* 1966, *1,* 245-276.

DUNHAM, R. B. The measurement and dimensionality of job characteristics. *Journal of Applied Psychology,* 1976, *61,* 404-409.

DUNHAM, R. B., ALDAG, R. J., & BRIEF, A. P. Dimensionality of task design as measured by the job diagnostic survey. *Journal of Applied Psychology,* 1977, *20,* 209-223.

GORSUCH, R. L. *Factor analysis.* Philadelphia: Saunders, 1974.

GUTTMAN, L. The determinancy of factor score matrices with implications for five basic problems of common factor theory. *British Journal of Statistical Psychology,* November 1955, *8,* 65-81.

HACKMAN, J. R., & OLDHAM, G. R. Development of the job diagnostic survey. *Journal of Applied Psychology,* 1975, *60,* 159-170.

LAWLER, E. E., SEASHORE, S. E., & STRAUSS, G. Quality of working life: Collaborative labor-management problem-solving. Workshop conducted at the Academy of Management Meetings, Kissemmee, Florida, August 17-18, 1977.

PIERCE, J. L., & DUNHAM, R. B. The measurement of perceived job characteristics: The job diagnostic survey versus the job characteristics inventory. *Academy of Management Journal,* 1978, *21,* 123-128.

SIMS, H. P., SZILAGYI, A D., & KELLER, R. T. The measurement of job characteristics. *Academy of Management Journal,* 1976, *19,* 195-212.

BIOGRAPHICAL NOTES

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