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Development and Test of a Task Level Model of Motivational Job Design

Chi-Sum Wong and Michael A. Campion
Krannert School of Management
Purdue University

The motivational value of jobs was predicted from the motivational value of tasks, task interdependence, and task similarity. This model was tested on 67 jobs (188 incumbents); analysts provided task measures and incumbents provided job measures. Task design had positive relationships, task interdependence had inverted-U relationships, and task similarity had scattered negative relationships with motivational job design. Results suggest that, to design motivating jobs, the motivational value of tasks should be increased, as should task interdependence (up to a moderate point); low to moderate amounts of task similarity do not matter. Increasing similarity and interdependence beyond a moderate point may lead to overly focused and specialized jobs that are less motivating. Also, job design mediated relations between task design and affective outcomes, but task design and interdependence had unique effects on ability requirements.

Job design research in the behavioral sciences has advanced knowledge about the relationship between the motivational features of jobs, such as autonomy and variety, and important outcomes, such as job satisfaction (e.g., Fried & Ferris, 1987; Hackman & Lawler, 1971; Herzberg, 1966; Loher, Noe, Moeller, & Fitzgerald, 1985; Turner & Lawrence, 1965). In other words, previous research has focused on Linkage 2 in Figure 1.

The focus of this study was on Linkage 1—how the motivational values of combinations of specific activities (here called *motivational task design*) relate to the motivational values of total jobs (here called *motivational job design*). This linkage is conceptually important for explaining why jobs have motivational features, and it is practically important for indicating how tasks should be developed or combined to design jobs with motivational features.

The distinction between a task and a job is not readily apparent in job design research, and the terms *task design* (e.g., Griffin, 1982) and *work design* (e.g., Hackman & Oldham, 1980) are often used to refer to the motivational design of jobs. This is despite the fact that the distinction is important in other research, such as research on personnel selection, compensation, and, in particular, job analysis.

In this study, we adopted definitions from job analysis research (Fine & Wiley, 1971; Gael, 1983; McCormick, 1979; U.S. Department of Labor, 1972). A task represents certain processes in which the worker, through his or her actions, transforms inputs into outputs meaningful to the goals of the job by using tools, equipment, or work aids. The actions of the task may be physical, mental, or interpersonal. On the other hand, a job is an aggregation of tasks assigned to a worker. When the same set of tasks are performed by more than one worker, those workers are said to have the same job.

This study addresses several deficiencies in the existing motivational job design literature for understanding Linkage 1. First, there exists no conceptual model specifying the relationship between motivational task design and motivational job design, even though there are a number of models addressing the relationship between motivational job design and outcomes (e.g., two-factor theory, the requisite task attributes model, the job characteristics model, activation theory, and others; Steers & Mowday, 1977). In the present study, we attempted to develop a simple task level model.

Second, current instruments (e.g., the Job Diagnostic Survey [JDS] constructed by Hackman & Oldham, 1975; the Job Characteristics Inventory constructed by Sims, Szilagyi, & Keller, 1976) measure entire jobs but do not tell how to measure task features. The present study was conducted to develop measures of task level attributes.

Third, existing motivational job redesign advice does not tell how tasks should be modified or combined. Instead, the advice either focuses on implementation issues, such as using conferences of employees to examine problem jobs (Ford, 1969) and diagnosing organizational context variables like technology and leadership (Griffin, 1982), or the advice just logically extends job design features, for example, increasing variety by combining tasks (Hackman & Oldham, 1980) and increasing responsibility by increasing accountability (Herzberg, 1966). Furthermore, the results of motivational job redesign studies are often unsuccessful (e.g., Frank & Hackman, 1975; Lawler, Hackman, & Kaufman, 1973; Locke, Sirota, & Wolfson, 1976), suggesting that current knowledge about how to change tasks is

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Correspondence concerning this article should be addressed to either Chi-Sum Wong, who is now at the Department of Organization and Management, Chinese University of Hong Kong, Shatin, New Territories, Hong Kong or Michael A. Campion, Krannert School of Management, Purdue University, West Lafayette, Indiana 47907.

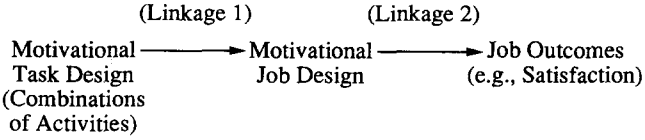

Figure 1. Linkages in motivational job design research.

inadequate. In the present study, we sought to provide specific advice as to how tasks should be formed into jobs.

Fourth, much of the existing research on job design has been criticized as addressing only the relationship between incumbent perceptions of the job and incumbent reactions to the job, with the accompanying problems of common method variance and extraneous (e.g., social) influences (e.g., Roberts & Glick, 1981; Salancik & Pfeffer, 1977, 1978). We attempted instead to examine the relationship between somewhat more objective task features and incumbent perceptions and reactions, and to keep the measures of different variables methodologically separated.

Fifth, there is some preliminary evidence from a laboratory setting that the motivational design of tasks and the motivational design of jobs are not related in a simple fashion (Campion & Stevens, 1989). There is also some recent field evidence that overall job satisfaction may be only partially predictable from satisfaction with individual tasks (Taber & Alliger, 1991). In this study, we addressed the relationship between the motivational design of tasks and the design of jobs in more depth, and we used a larger scale field study than did Campion and Stevens.

The purpose of this study was to develop and test a model of Linkage 1. The research question was defined as one of relating the parts (tasks) to the whole (job). Based on a review of a broad variety of other literatures that also relate parts to wholes, the model predicts motivational job design from motivational task design and from the relationships among tasks. The relationships among tasks are defined in terms of task interdependence and task similarity. The model is presented in Figure 2, and each of the components is described in the following sections.

Task Design

Motivational task design is the amount of motivational features (e.g., variety, autonomy) a task has when it is evaluated independently of other tasks of the job. Motivational job design is the amount of motivational features a job has when it is evaluated as a total entity. As an initial expectation (Hypothesis 1), we predicted that there would be a positive relationship between motivational job design and the sum of the motivational design of its tasks. The sum was used to include the effects of the number of tasks as well as the average motivational task design. The number of tasks has been previously found to influence perceptions of variety (Globerson & Crossman, 1976).

Task Interdependence

The notion of interdependence is frequently discussed in articles that address the relationship between parts and wholes. This study develops the analogous notion of task interdependence. Borrowing from the definition of interdependence among work units used by McCann and Ferry (1979), task interdependence is defined here as the extent to which the inputs, processes, or outputs of the tasks affect or depend on the inputs, processes, or outputs of other tasks within the same job. Because inputs, processes, and outputs are included, this definition is comparable to the definition of a task, described earlier.

A common finding is that the interdependence of the parts increases the complexity of the whole. For example, dual-task interdependence can lead to interference when the tasks are performed together (e.g., Duncan, 1979; Friedman & Polson, 1981; Kramer, Wickens, & Donchin, 1985; Navon & Gopher, 1979; Navon & Miller, 1987). Interdependence among jobs can increase feelings of responsibility among incumbents (e.g., Kiggundu, 1981, 1983). Intragroup interdependence can influence group performance, often making it better or worse than that expected from the sum of individual abilities (e.g., Hackman, Brousseau, & Weiss, 1976; Rohrbaugh, 1981; Schiflett, 1972; Steiner, 1972; Stumpf, Freedman, & Zand, 1979; Thomas, 1957; Tziner & Eden, 1985). Interdepartmental interdependence can increase the needed level of coordination, thus increasing complexity within the organization (e.g., Cheng, 1983; Ito & Peterson, 1986; McCann & Galbraith, 1981; Mintzberg, 1979; Thompson, 1967; Van de Ven & Delbecq, 1976; Victor & Blackburn, 1987). Interorganizational interdependence can increase the complexity of organizational structures and processes (e.g., Aiken & Hage, 1968; Hall, 1982; Pfeffer, 1972; Schermerhorn, 1977). Finally, although not part of the interdependence literature, research on training suggests that the whole method of training is better than the part method when tasks are interde-

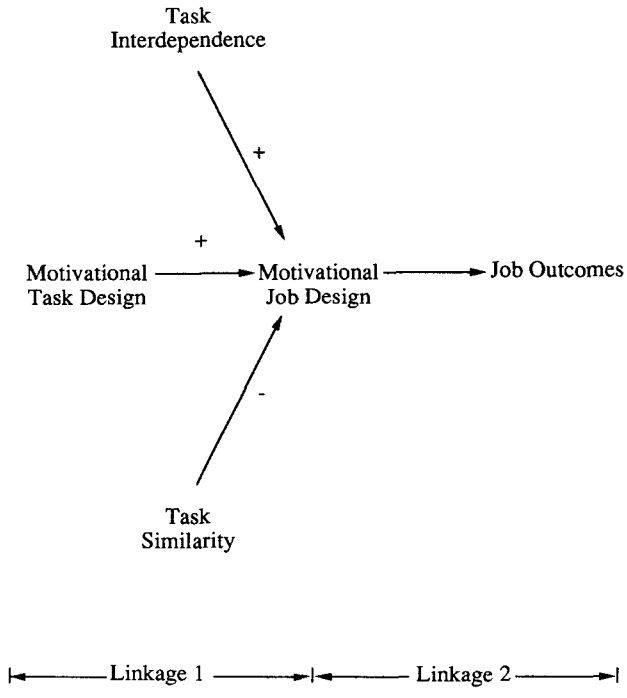

Figure 2. Proposed task level model of motivational job design.

pendent (e.g., Naylor & Briggs, 1963; Naylor & Dickinson, 1969).

These findings suggest that interdependence among tasks may lead to a more complex job, and the term *job complexity* has often been used as a synonym for the effects of motivational job design (e.g., Aldag, Barr, & Brief, 1981; Gerhart, 1988; Hogan & Martell, 1987; Wood, 1986). Furthermore, interdependence among tasks seems logically related to many motivational job design features. For example, when the outputs of some tasks are the inputs of other tasks, there may be higher intrinsic job feedback. That is, the quality of performance on some tasks is likely to be indicated when their output is needed to perform other tasks. Interdependent tasks may require more coordination and thus involve activities such as planning, scheduling, and inspecting, which may increase variety and skill usage. Autonomy may increase because coordinating tasks requires the worker to decide among different schedules or ways of completing all the tasks. Identity may also increase if the interdependence among the tasks increases the likelihood that an entire piece of work is completed, such as if the tasks are all on the same product.

In addition, studies of job redesign suggest that adding interdependent tasks increases employee perceptions of motivational job design and feelings of satisfaction. For example, supervisory jobs that involved producing and inspecting the same product were combined (Davis & Valfer, 1965), clerical jobs that had sequential work-flow relationships were combined (Orpen, 1979), quality control tasks were added to manufacturing jobs (Griffin, 1983), new tasks that affected the performance of existing tasks were added to receptionist jobs (Griffeth, 1985), quality control and decision-making tasks were added to bank teller jobs (Griffin, 1989), and clerical jobs that had direct input–output relationships were combined (Campion & McClelland, 1991). On the other hand, job redesign studies that added independent tasks tended to have nonsignificant or negative effects on motivational job design and satisfaction. For example, telephone operators were allowed to shift freely between two independent jobs (Lawler et al., 1973), independent computer operator jobs were combined (Latack & Foster, 1985), and new unrelated tasks brought about by computerization were added to managerial jobs (Liden, Parsons, & Nagao, 1987). Finally, laboratory studies have also found a positive effect of task interdependence on intrinsic motivation (Hirst, 1988).

Therefore, we predicted (Hypothesis 2) that there would be a positive relationship between task interdependence and motivational job design. This effect was expected to be independent of motivational task design in that task interdependence would relate to motivational job design even after motivational task design was controlled.

Task Similarity

Another common construct in the part–whole literatures is the similarity of parts. Comparable to the definitions of tasks and task interdependence, task similarity is defined as the extent to which the tasks within the same job involve the same inputs, processes, or outputs.

A common finding in these literatures is that the similarity of the parts *decreases* the complexity of the whole. For example, when the stimuli or resources of two tasks are similar in a dual-task paradigm, the expected interference may not occur (e.g., Friedman & Polson, 1981; Kramer et al., 1985; Logan & Burkell, 1986). In the intragroup literature, group homogeneity in terms of abilities, motivation, and background can reduce interaction and discussion, thus reducing group effectiveness (e.g., Hewett, O'Brien, & Hornik, 1974; Janis, 1972; Tziner, 1986; Tziner & Eden, 1985; Yetton & Bottger, 1983). Interdepartmental specialization increases the resources and activities needed for coordination (e.g., Ito & Peterson, 1986; McCann & Galbraith, 1981; Mintzberg, 1979), but similarity among departments may decrease the required level of coordination. Finally, the training literature is again relevant in that when the stimuli and responses used in the training situation and on the job are similar (as initially discussed in the context of the theory of identical elements; Thorndike, 1903; Thorndike & Woodworth, 1901), transfer of training is less difficult (e.g., Baldwin & Ford, 1988; Gick & Holyoak, 1987).

These findings suggest that similarity among tasks may lead to a less complex job. There are three additional reasons why task similarity may be negatively related to motivational job design. First, features such as task and skill variety will probably decrease as tasks become more similar. Second, when tasks are similar, the need for coordinating activities, which have high motivational value (e.g., planning and scheduling), would be reduced. Third, grouping tasks into jobs according to their similarity is consistent with the principles of specialization and simplification, used in the traditional industrial engineering approach to job design (e.g., Barnes, 1980; Gilbreth, 1911; Taylor, 1911). This mechanistic approach to job design is negatively related, both conceptually and empirically, to the organizational-psychology-based motivational approach to job design (Campion, 1988; Campion & Thayer, 1985; Salvendy, 1978) that is the focus of this study.

Therefore, we predicted (Hypothesis 3) that there would be a negative relationship between task similarity and motivational job design. This effect was expected to be independent of motivational task design in that task similarity would relate to motivational job design even after motivational task design was controlled.

Task Level Constructs and Job Outcomes

The distinction between Linkages 1 and 2 implies that task level constructs influence motivational job design, which in turn influences job outcomes (Figure 2). Two types of outcomes were examined to test this mediating effect of motivational job design on the relationship between task level measures and outcomes.

Affective Outcomes

The most studied outcomes from motivational job design are affective outcomes, especially job satisfaction (Fried & Ferris, 1987; Loher et al., 1985). We predicted (Hypothesis 4) that motivational job design would mediate the relationship between the task level measures and affective outcomes of jobs.

Ability Requirement Outcomes

Other important outcomes from motivational job design are job ability requirements. These outcomes have been studied so that the potential staffing, training, and compensation implications of job redesign could be anticipated. Previous research has demonstrated that higher motivational job design is related to higher mental ability requirements (Campion, 1989; Dunham, 1977; Gerhart, 1988; Rousseau, 1982; Schneider, Reichers, & Mitchell, 1982; Taber, Beehr, & Walsh, 1985). Furthermore, just as motivational job design has been used to describe job complexity, so have mental ability requirements (e.g., Fleishman & Quaintance, 1984). Thus, we predicted (Hypothesis 5) that motivational job design would mediate the relationship between the task level measures and the ability requirement outcomes of jobs.

Method

Overview

Job incumbents provided the task statements and measures of motivational job design as well as of affect and ability outcomes; independent analysts provided the task level measures of motivational task design, interdependence, and similarity. This research strategy was used for several reasons. First, it allowed us to methodologically separate the task level measures and the job level measures. Second, we felt that incumbents could not judge the motivational values of individual tasks without being influenced by knowledge of the motivational value of the entire job. Third, it is realistic of job design and redesign studies to use analysts for examining the job and incumbents to collect outcome data. Likewise, jobs are initially designed by analysts (e.g., managers and engineers) on the basis of an examination of tasks. When jobs are initially designed, there are no existing incumbents. Employees subsequently hired or placed on the jobs then provide evaluations of the job design and outcomes.

Sample

The sample consisted of 188 employees in 67 jobs in a university in the midwestern United States. There were 12 administrative or supervisory jobs, 7 professional jobs, 13 technical jobs, 23 clerical jobs, and 12 service jobs. The statistical power for job level analyses was approximately 80% to detect a correlation of .30, or a squared multiple correlation of .16 for regression models with three independent variables ($p < .05$, Cohen, 1977). Power for incumbent level analyses was 99% for the same specifications. Sampling was guided by an attempt to include a broad range of jobs to enhance variance and to use jobs with multiple incumbents to enhance the reliability of the measures.

Measures

Job analysis. Job analyses were conducted according to the procedures of functional job analysis (e.g., Fine & Wiley, 1971); each task was described in terms of the action performed, the object of the action, instructions (if any), tools or equipment (if any), and the expected output. This resulted in listings of tasks that were standardized across jobs and stated in terms of the components of the definitions of task interdependence and similarity (i.e., inputs or objects, processes or actions, and outputs).

A primary concern was the number of tasks per job that would ensure the appropriate depth of analysis. For guidance, we counted the number of tasks in the descriptions of all 92 of the miscellaneous clerical jobs (code 240) in the *Dictionary of Occupational Titles* (DOT; U.S. Department of Labor, 1977) because functional job analysis was used to write those descriptions. This job group was considered a good comparison because it was at about the same level as many of the jobs in the present study, and because the present study contained many clerical jobs. The 92 jobs had a mean of 5.53 tasks ($SD = 2.29$). Thus, the mean of 5.84 tasks ($SD = 1.49$) that emerged in the present study was considered an appropriate depth of analysis.

The DOT descriptions and the organization's existing job descriptions were used to begin the analysis. The organization's descriptions were somewhat more complete than is often found in organizations because the descriptions had been recently updated as part of a job evaluation project. Although they identified the major tasks, they lacked the detail desired for the study. Therefore, at least one incumbent per job was interviewed to validate the task statements and enhance their detail. A typical example is the task of a purchasing agent, originally described as "approves purchase orders and executes contracts." This description was expanded to

> edits purchasing documents, approves, and follows up purchases of equipment, materials, and services for the purchasing department (including approval of change orders and exceptional invoices, resolution of order problems, preparation of necessary correspondence, technical data, product or system specifications, etc.).

In addition, questionnaires distributed to incumbents asked them to verify that they performed the tasks, to rate the relative importance of each task to the job, to rate the average percentage of time spent on each task, and to indicate any other tasks they performed. Approximately 35% of incumbents indicated that they performed additional tasks, but in nearly all instances the tasks were of minor importance and the time spent on them was minimal (e.g., less than 10% of work time). Tests of hypotheses with and without these incumbents revealed no important differences, so only the results for the total group are presented.

Motivational job design. Incumbents completed the motivational scale of the self-report Multimethod Job Design Questionnaire (MJDQ; Campion, 1988). This instrument was used because its items cover a wider range of motivational features than do other more popular instruments (e.g., the JDS). Prior research (Campion, 1988; Campion, Kosiak, & Langford, 1988; Campion & Thayer, 1985) has demonstrated the reliability of the MJDQ and its convergent and discriminant validity with the JDS. Excluding several items that were not applicable at both the job and task level (e.g., promotion, job security), the measure had 14 items: autonomy, intrinsic feedback, extrinsic feedback, social interaction, goal clarity, variety, identity, skill level, skill variety, significance, growth, achievement, participation, and recognition. A common 5-point *agree–disagree* response format was used. Scores were averages of applicable items, with larger values indicating higher motivational value. Internal consistency reliability was .81.

Motivational task design. The same set of items from the MJDQ, with the word *task* replaced for *job*, was used by independent analysts to evaluate the motivational design of the tasks. A 3-point *agree–disagree* scale was used because previous research had indicated that the range of discriminability was smaller at the task level (Campion & Stevens, 1989). Scores from each analyst were standardized to avoid leniency and severity. Scores for individual tasks were summed to create a task design score for each job. Larger values indicated higher motivational value. Internal consistency reliability was .78, and interrater reliability (of the means of the two analysts' ratings) was .91. Differential weighting of the tasks by importance and time spent was explored. There were no appreciable differences in the results, and they are not reported.

Task interdependence and task similarity. The variety of part–whole literatures and the successful job redesign studies were examined to determine dimensions that could be meaningfully defined at the task level. A large number of dimensions were collected from nearly 30 studies. Considerable overlap among the various literatures was observed, and so the dimensions were grouped into common dimensions to be used as items. Several items were defined to focus on each component of the task definition: inputs, processes, and outputs. Table 1 contains the 14 items constructed to measure the interdependence of task pairs. The measure for similarity was comparable but contained only 10 items because some of the dimensions were not applicable to similarity.

The same 3-point *agree–disagree* response format used for motivational task design was used for task interdependence to avoid the possibility of introducing any artificial differences in variances among the three task measures. To apply the measures, we formed the tasks from each job into all possible pairs (e.g., a job with 6 tasks would be formed into 15 pairs of tasks). Analysts applied the measures to each pair, and their scores were standardized to avoid leniency and severity. The scores on individual items were then averaged for each task pair, and the pairs were averaged to the job level (with larger values indicating higher interdependence or similarity). Internal consistency reliabilities for the final scores were .92 and .91, and interrater reliabilities of the mean of the two analysts' ratings for the final scores were .65 and .58, respectively.

Six analysts were trained to provide the three task measures. Two analysts provided each measure for each job, and their scores were averaged. To prevent potential biases that might be created by knowledge of the other measures, assignments were counterbalanced such that each pair of analysts provided only one of the three task measures for each job. To avoid potential confusion, separate training sessions were conducted for each measure, and ratings were made on one measure at a time. Training consisted of an explanation of the construct, practice applying the measure, and feedback on agreement. Training continued until 90% agreement was reached. The analysts were instructed to focus solely on task content and were not informed about which tasks were combined to form jobs. The entire rating process averaged 25 hr for each analyst. To check for potential fatigue effects, we compared reliabilities for the first half of the ratings with reliabilities for the second half for each measure. No differences were observed.

Table 2 provides examples of high and low scoring tasks or task pairs on the three task measures. It illustrates the nature of the task constructs and the material used to train the analysts. The tasks in the table are abbreviated versions of the detailed functional job analysis statements actually used.

Affective outcomes. Affective outcomes were measured in the incumbent questionnaire. The measure was a six-item composite of three affective outcomes that are commonly related to motivational job design and to each other (Campion, 1988; Campion & Thayer, 1985). There were two items on satisfaction (borrowed from Brayfield & Rothe's, 1951, scale), two items on intrinsic motivation (borrowed from

Table 1
Dimensions of Task Interdependence

Dimension	Description
	Task input
1. Materials or supplies	One task obtains, stores, or prepares the materials or supplies necessary to perform the other task.
2. Information	One task obtains or generates information for the other task.
3. Product or service	One task stores, implements, or handles the products or services produced by the other task.
	Task process
4. Input–output relationship	The products (or outputs) of one task are the supplies (or inputs) necessary to perform the other task.
5. Method or procedure	One task plans the procedures or work methods for the other task.
6. Scheduling	One task schedules the activities of the other task.
7. Supervision	One task reviews or checks the quality of products or services produced by the other task.
8. Sequencing	One task needs to be performed before the other task.
9. Time sharing	Some of the work activities of the two tasks must be performed at the same time.
10. Support service	The purpose of one task is to suport or otherwise help the other task get performed.
11. Tools or equipment	One task produces or maintains the tools or equipment used by the other task.
	Task output
12. Goal	One task can be accomplished only when the other task is properly performed.
13. Performance	How well one task is performed has a great effect on how well the other task can be performed.
14. Quality	The quality of the product or service produced by one task depends on how well the other task is performed.

Note. The task similarity measure contained 10 comparable measures (excluding Items 4, 6, 8, 9, and 14 and including an item on customer or client).

Table 2
Examples of High- and Low-Scoring Tasks or Task Pairs

Measure	High-scoring task or task pair	Low-scoring task or task pair
Motivational task design	1. Supervises administration of undergraduate library (higher autonomy, variety identity, etc.)	1. Records the receipts for incoming library materials (lower motivational value)
	2. Analyzes data from laboratory experiments (higher autonomy, variety identity, etc.)	2. Inputs data from laboratory experiments (lower motivational value)
Task interdependence	1. Evaluates vendors and approves purchases of equipment (higher interdependence of information, sequencing, support service, goal, etc.)	1. Prepares technical reports on various commodities and coordinates equipment installation between vendors and users (lower interdependence)
	2. Performs radiological and develops and examines the quality of the X-ray film (higher interdependence of materials, product, supervision, sequencing, goal, etc.)	2. Schedules radiological exams and cleans radiological exam room, cots, and equipment (lower interdependence)
Task similarity	1. Verifies cataloging information of library materials and updates the card catalog of the library (higher similarity of information, method, tools, goal, etc.)	1. Trains and evaluates file keepers and transfers old records into the on-line computer system (lower similarity)
	2. Operates paper breakdown and wrapping equipment and operates the bursting and check signing machine (higher similarity of methods, supervision, tools, etc.)	2. Drives the delivery vehicle and assists the computer tape librarian in filling tapes (lower similarity)

Note. The task descriptions are abbreviated versions of the detailed functional job analysis statements actually used. Complete task statements and listings of job titles can be obtained from either Chi-Sum Wong or Michael A. Campion. Task descriptions in the same row are drawn from the same job. Explanations of the differences between the tasks (in parentheses) are illustrations.

Hackman & Lawler's, 1971, scale), and two items on job involvement (borrowed from Lodahl & Kejner's, 1965, scale). A 5-point *agree–disagree* response format was used. Scores were averages, with larger values indicating higher levels of affective outcomes. Internal consistency reliability was .84. A second five-item measure of affective outcomes from the JDS (Hackman & Oldham, 1980) was also used, but because the results were nearly identical, only the results for the first measure are reported.

Ability requirements. Incumbents were asked to estimate the minimum amount of 10 generic abilities and skills needed to perform their jobs (on the basis of the measures used by the U.S. Department of Labor, 1972, 1977, 1981): reading, writing, oral communication, problem solving, math, vocational training, physical strength, arm/leg skill, finger/hand skill, and visual skill. Respondents indicated the *level* of each ability or skill required on anchored 5- to 9-point rating scales based on the descriptions provided by the Department of Labor publications. Incumbents were also asked to estimate the *frequency* with which they used each of these abilities and skills (except vocational training) on 5-point anchored scales ranging from *several times a day* to *once a week or less.*

To reduce the number of ability measures, we performed principal components analyses with varimax rotation. A four-factor solution best represented the data, on the basis of a minimum eigenvalue of 1.0 and a scree test. The factors explained 73.5% and 65.3% of the total variance at the job and incumbent levels, respectively. Unit-weighted composites were calculated from the items with the highest loadings: *Mental ability level* was composed of the reading, writing, oral communication, problem-solving, math, and vocational-training measures, answered in terms of the level of ability required (internal consistency reliability at the job and incumbent level was .79 and .74, respectively). *Mental ability frequency* was composed of the reading, writing, oral-communication, problem-solving, and math measures, answered in terms of the frequency with which each skill was required (reliability at the job and incumbent level was .83 and .82, respectively). The *physical ability* composite was made up of the physical-strength and the arm/leg skill measures (answered in terms of both level and frequency; reliability for the job and incumbent level was .87 and .85, respectively). The *finger/visual skill* composite was composed of the finger/hand and visual skills measures (answered in terms of both level and frequency; reliability was .75 and .78 for the job and incumbent level,

respectively). Larger scores on the composites indicate higher ability requirements.

Demographics. Several demographics were collected to serve as potential control variables: organizational tenure (88.6% of the respondents had 1 year or more, and 45.1% had 5 years or more), job tenure (84.9% had 6 months or more, and 60% had 2 years or more), age (89.1% were 25 years or older, and 53.6% were 35 years or older), sex (58.4% were women), and education (97.8% had at least a high school degree, and 35.2% had at least a bachelor's degree). In general, the demographics did not show any substantial relationships with other measures and are not reported further.

Procedure

The personnel department at the university provided information about departments and arranged initial contacts. The sample was not randomly selected. Instead, only departments expressing interest in the study were included. After reviewing the university's job description and interviewing at least one incumbent from each job, we prepared and distributed a questionnaire to all incumbents through their supervisors. Questionnaires were returned through university mail (76.9% return rate). Incumbents were told that the study was part of a research project and that the results would not affect their jobs. Doctoral students served as analysts and worked concurrently on the evaluation of the task level data. Human-subjects committee approval was obtained.

Results

The focus of this study was on the nature of the jobs. Individual incumbents were used only as a means of gathering information about the jobs, and multiple responses were collected to reduce the effects of differences in individual perceptions. The early conceptual formulation of motivational job design made it clear that the job was the proper level of analysis (e.g., Hackman & Oldham, 1975, pp. 159, 161, and 168), but measurement and analysis since that time nearly always has been focused at the individual level of analysis. Because aggregation can affect the results observed (Campion, 1988; Roberts & Burstein, 1980), the analyses presented were conducted at both the job and individual levels, with individual incumbent data being averaged for analyses at the job level. Both traditional ($p < .05$) and marginal ($p < .10$) levels of significance are indicated so that small effect sizes are not overlooked, but marginal effects should be interpreted with caution.

The means and standard deviations on the measures revealed no apparent range restriction or ceiling effects (Table 3). Intercorrelations among the task measures indicated that motivational task design was unrelated to interdependence but was negatively related to similarity, whereas interdependence and similarity were positively related.

Tests of Hypotheses

Hypothesis 1 proposed a positive relationship between motivational task design and motivational job design. Correlations were significant at both levels of analysis (Table 3). Because the measure of motivational task design was the sum of the motivational values for all the tasks in the job, both the average motivational value and the number of tasks were also examined separately. Both were positively and significantly related to motivational job design, but both were of slightly smaller magnitude than the sum. The correlations for average motivational value were .19 at the job level and .13 at the incumbent level; correlations for number of tasks were .21 and .13, at the job and incumbent level, respectively ($p < .05$).

Hypothesis 2 proposed a positive relationship between task interdependence and motivational job design. The correlation at the job level was not significant, whereas the correlation at the incumbent level was marginally significant in the negative direction (Table 3). Regression analyses on motivational job design showed that the effect of interdependence was not significant when motivational task design was controlled (Table 4).

Hypothesis 3 proposed a negative relationship between task similarity and motivational job design. The correlation was negative and significant at the incumbent level only (Table 3). But regression analyses on motivational job design showed that task similarity was not significant when motivational task design was controlled (Table 4).

Hypothesis 4 proposed that motivational job design would mediate the relationship between the task level measures and the affective outcomes. The three conditions necessary to support a mediator were confirmed (James & Brett, 1984). First, there was a significant correlation between motivational job design and the affective outcomes (Table 3). Second, motivational task design was significantly correlated with the affective outcomes (Table 3). Third, the effects of motivational task design became nonsignificant when motivational job design was included in regression analyses on the affective outcomes (Table 5).

Hypothesis 5 proposed that motivational job design would mediate the relationship between the task level measures and the ability requirement outcomes. Motivational job design, motivational task design, and task interdependence were significantly correlated with mental ability level (Table 3), but motivational task design and interdependence remained significantly related to mental ability level even when motivational job design was controlled (Table 5). Furthermore, the task measures showed more relationships with the other abilities than did motivational job design. In particular, task interdependence showed the largest correlations with mental ability frequency and physical ability (Table 3). These results suggest that motivational job design did not completely mediate the relationships between the task level measures and the ability outcomes.

Supplementary Analyses

These analyses provide only mixed or poor support for the proposed model. In particular, the findings suggest that the relationships between the task level measures and motivational job design may be more complicated than the model had proposed.

Task interdependence and motivational job design scores were examined on a job-by-job basis. Some jobs low in motivational design had low task interdependence scores, as expected (e.g., housekeeper, custodian, and grounds equipment handler), but other such jobs had high interdependence scores (e.g., acquisition and fiscal office assistant, computer technician, and appointment clerk). This latter group of jobs could be characterized by work activities that were very focused and thus inter-

Table 3
Means, Standard Deviations, and Intercorrelations Among Measures

Measure	*M*	*SD*	1	2	3	4	5	6	7	8	9
					Job level[a]						
1. Motivational job design	3.84	0.36	—								
2. Motivational task design	11.21	3.35	.29**	—							
3. Task interdependence	1.62	0.54	−.12	−.03	—						
4. Task similarity	1.91	0.55	−.10	−.32**	.52**	—					
5. Affective outcome	3.79	0.52	.67**	.30**	−.05	−.03	—				
6. Mental ability level	3.94	0.91	.30**	.39**	.30**	.08	.27*	—			
7. Mental ability frequency	3.86	0.72	.11	.29**	.40**	.10	.19*	.53**	—		
8. Physical ability	2.74	1.02	.08	.05	−.23**	−.06	.02	−.17*	−.02	—	
9. Finger/visual ability	4.09	0.65	−.12	−.06	−.03	−.11	−.15	−.11	.24**	.23**	—
					Incumbent level[b]						
1. Motivational job design	3.77	0.50	—								
2. Motivational task design[c]	—	—	.19**	—							
3. Task interdependence[c]	—	—	−.10*	—	—						
4. Task similarity[c]	—	—	−.18**	—	—	—					
5. Affective outcome	3.75	0.66	.56**	.14**	−.10	−.06	—				
6. Mental ability level	3.87	0.98	.22**	.28**	.34**	.05	.25**	—			
7. Mental ability frequency	3.72	0.92	.10	.17**	.29**	.06	.10	.47**	—		
8. Physical ability	2.61	1.15	.13**	−.02	−.32**	−.02	.06	−.11*	.13*	—	
9. Finger/visual ability	3.97	0.93	−.01	−.06	.11*	.05	−.06	.05	.48**	.39**	—

Note. Task measures were collected at the job level only.
[a] $n = 67$ jobs. [b] $n = 188$ incumbents. [c] Each incumbent was assigned the value of his or her job.
* $p < .10$. ** $p < .05$.

dependent. Moreover, task interdependence scores were only moderate for jobs high in motivational design (e.g., assistant director and athletic trainer of recreational sports, senior staff resident, and administrative secretary). These jobs had interdependent tasks but, on average, the tasks were less interdependent than in simple jobs with very focused tasks.

It may be that certain motivational features decrease with very high levels of interdependence. For example, task variety and the skill requirements may be reduced if interdependence is too high. The amount of social interaction, extrinsic job feedback, and recognition may decrease if the worker interacts only with a small, highly interdependent group of co-workers. Job significance and identity also may suffer if the job is so focused that the worker cannot easily see his or her contribution to the overall product or service of the organization.

In other words, an inverted-U curve may best represent the relationship between task interdependence and motivational job design. Two statistical tests were conducted to assess this possibility. First, task interdependence and its squared term were regressed on motivational job design to test for the presence of a quadratic relationship (Neter, Wasserman, & Kutner, 1985; Stone, 1988). The squared term was negative and significant at the job level and negative and marginally significant at the incumbent level (see Table 6). The squared interdependence term was also significant when simultaneously regressed with motivational task design and task similarity on motivational job design (not shown). Second, subgroup correlations were calculated separately for jobs with task interdependence scores below and above the mean. The subgroup with interdependence scores below the mean showed positive correlations with motivational job design, but the subgroup with interdependence scores above the mean showed negative correlations (see Table 7). Both analyses support the presence of an inverted-U relationship between task interdependence and motivational job design.

Task interdependence appears to have an inverted-U relationship with other variables, as suggested by the subgroup correlations in Table 7. The subgroup with interdependence scores

Table 4
Regressions of Task Level Measures on Motivational Job Design

Hypothesis/variable	Job level (n = 67) Standardized coefficient	R^2	Incumbent level (n = 188) Standardized coefficient	R^2
Hypothesis 2		.09**		.04**
Motivational task design	.28**		.18**	
Task interdependence	−.11		−.09	
Hypothesis 3		.08*		.04**
Motivational task design	.28**		.14*	
Task similarity	−.01		−.11	

Note. All variables were entered simultaneously in each regression.
* $p < .10$. ** $p < .05$.

below the mean showed positive correlations with affective outcomes and motivational task design, whereas the subgroup with interdependence scores above the mean showed negative correlations. In addition, interdependence was positively related to similarity only for the subgroup with high interdependence between tasks, which suggests that task interdependence and task similarity become more alike when they are high. Other variables in the study were also checked for inverted-U relationships, but none were found.

Discussion

Summary and Implications

In this study, we proposed a task level model of motivational job design wherein motivational job design was predicted from motivational task design, task interdependence, and task similarity. The relationships discovered between motivational job design and the task level measures are shown in Figure 3, in which the motivational job-design means are graphed for each third of the sample for each task measure.

In support of Hypothesis 1, the results indicate that motivational task design was positively related to motivational job design. That is, the higher the total motivational value of the tasks, the higher the motivational value of the job. Although it is important that this relationship exists, it is noteworthy that it was of only a moderate size (r = .29). There was substantial variance in the motivational design of jobs that was not clearly indicated by the motivational design of their tasks when the tasks were viewed in isolation.

Hypothesis 2 was not directly supported in that task interdependence was not positively related to motivational job design. Task interdependence did explain additional variance in motivational job design, but it appeared to have an inverted-U relationship. Jobs with medium task interdependence had higher motivational values, whereas jobs with low or high task interdependence had lower motivational values. We had expected a linear relationship, on the basis of six different bodies of literature that have related parts to wholes and their common find-

Table 5
Regressions of Task Level Measures on Outcomes While Controlling for Motivational Job Design

Hypothesis/variable	Job level (n = 67) Standardized coefficient	R^2	Incumbent level (n = 188) Standardized coefficient	R^2
Hypothesis 4: Affective outcomes		.46*		.31*
Motivational job design	.63*		.55*	
Motivational task design	.12		.04	
Hypothesis 5: Mental ability level required		.30*		.27*
Motivational job design	.26*		.22*	
Motivational task design	.32*		.28*	
Task interdependence	.34*		.40*	

Note. All variables were entered simultaneously in each regression.
* $p < .05$.

Table 6
Quadratic Regression Analyses on Motivational Job Design

Variable	Job level (n = 67) Standardized coefficient	R^2	Incumbent level (n = 188) Standardized coefficient	R^2
Task interdependence	−.05		−.04	
Squared task interdependence	−.28**	.09*	−.14*	.04*

Note. All variables were entered simultaneously in each repression.
* $p < .10$. ** $p < .05$.

Table 7
Correlations Between Task Interdependence and Other Variables for Jobs With Interdependence Scores Below and Above the Mean

Variable	Task interdependence: Scores below the mean, Job level (n = 32)	Scores below the mean, Incumbent level (n = 89)	Scores above the mean, Job level (n = 35)	Scores above the mean, Incumbent level (n = 99)
Motivational job design	.34*	.20*	−.39*	−.20*
Affective outcomes	.25*	.06	−.45*	−.20*
Motivational task design	.47*	—	−.44*	—
Task similarity	−.02	—	.50*	—

Note. Task variables were measured at the job level only.
* $p < .05$.

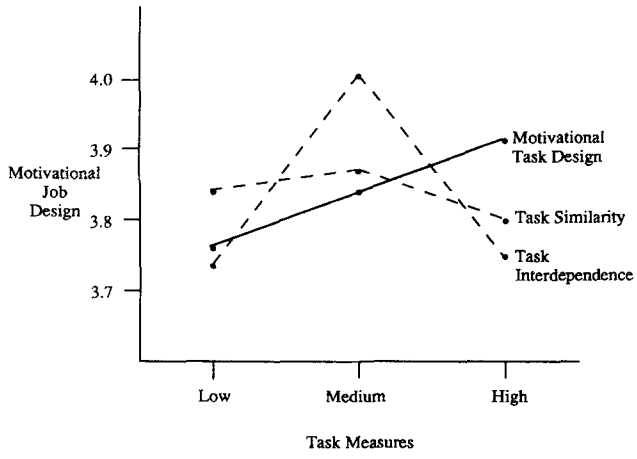

Figure 3. Graph of relationships between motivational job design and task level measures.

ing that interdependence among parts tends to relate to more complex wholes. However, an inverted-U relationship in the context of motivational job design has been discovered in research on activation theory (e.g., Gardner, 1986; Scott, 1966). Task performance and affective outcomes have been found to be reduced when stimulation is either too low (because boredom occurs) or too high (because overload occurs). The process seems to be slightly different in the case of task interdependence. Highly interdependent tasks do not appear to lead to overly complex and stimulating jobs. Instead, they seem to narrow the range and perhaps the amount of stimulation. Thus, it may be that both low and high task interdependence lead to reduced motivational job design because they reduce the stimulation a job has to offer.

Hypothesis 3 received mixed support. Task similarity showed only scattered negative relationships with motivational job design, indicating that jobs with very similar tasks tended to have lower motivational values. The relationship was as predicted, but the size of the relationship was small and the incremental contribution was not significant. Although there was not an explicit hypothesis, task similarity was found to be positively related to task interdependence. The relationship existed primarily when interdependence was high. This suggests that higher task interdependence may relate to lower motivational job design because it becomes like task similarity. In other words, very high interdependence may decrease motivational job design because it reduces variety and enhances specialization.

Hypothesis 4 predicted that motivational job design would mediate the relationship between motivational task design and the affective outcomes. This mediating role was supported, suggesting that motivational task design does not influence affective outcomes directly but instead influences motivational job design, which in turn influences affective outcomes. Of course, this cross-sectional study does not prove the causation, it just provides evidence that is consistent with such an explanation.

Hypothesis 5 predicted that motivational job design would mediate the relationship between motivational task design and ability requirements, but it was not supported. Both motivational task design and task interdependence had unique relationships with ability requirements beyond the effects of motivational job design. They were both positively related to mental ability, and interdependence was also negatively related to physical ability. These results suggest that task level analyses may be valuable in research on the ability requirement implications of job design decisions (cf. Campion, 1989; Dunham, 1977; Schneider et al., 1982). That is, even though an examination of the entire job is adequate to predict affective outcomes, a detailed task level analysis is needed to more fully understand the ability requirement implications of motivational design. The need for detailed task level analysis in order to understand ability requirements has long been known in job analysis research, but the results of this study suggest that there may also be value in examining interdependencies among tasks when attempting to predict ability requirements.

Assuming that future research supports these findings, there are at least three potential practical recommendations for how to design jobs with motivational features. First, the sum of the quality of the individual tasks is important. Designers should strive to include as many tasks with the highest motivational values as possible. Second, moderate levels of task interdependence should be sought. Low task interdependence should be avoided, and too much task interdependence may result in jobs that are too highly focused and hence reduced in motivational value. Third, some degree of task similarity does not reduce the quality of motivational job design and is probably necessary for accomplishing the minimum division of labor needed for efficient production (Campion & Stevens, 1989; Davis, Canter, & Hoffman, 1955; Taylor, 1979). At high levels, however, similarity may also become dysfunctional and result in lower motivational value.

Limitations

Several limitations of the present study may potentially explain some of the mixed results and the relatively small percentages of variance explained. First, the sample was suboptimal in terms of the number of incumbents per job and the range of possible motivational values. The jobs averaged only 2.8 incumbents each and generally underrepresented the higher occupational levels. Both factors could have decreased the reliability of the measures and the likelihood of detecting effects. As evidence of this concern, the correlations at the job level were only slightly larger than those at the individual level, but they should be much larger if between-job variance is increased by the aggregation (Algera, 1983; Campion, 1988; Roberts & Burstein, 1980).

Second, the results were partly limited by how jobs have evolved in this organization. For example, the task level constructs were conceptually distinct, but they were correlated in this sample. It may be possible to create jobs with highly interdependent yet dissimilar tasks, but the tasks in this setting were positively related. It is unknown how the relationships among the independent variables could have influenced the results.

Third, the results might have been clearer if the jobs had been broken down into a greater number of tasks. However, an

average of six tasks was similar to the number used in the DOT for comparable jobs, and the task statements were written in detailed functional job analysis form. Even with six tasks, there were still 15 task pairs from which to evaluate interdependence and similarity. Also, more task statements would be unlikely to increase the correlation between task design and job design (i.e., predicting a job's motivational value from a few large pieces should be easier than predicting its motivational value from many small pieces). Nevertheless, the results might have been different had the job analyses been more extensive.

Fourth, the procedures of this study created some artificial constraints that may have limited the findings. For example, all the measures were completely separated methodologically. Different analysts provided each of the task level measures for each job, and incumbents provided the job level measures. Although this research strategy avoids concerns with common method variance, it may also produce the lowest possible estimates of shared variance between constructs. In addition, the interrater reliabilities of the task level measures were modest, thus reducing the amount of variance that could be explained by them.

In another procedural limitation, the analysts of the task level measures were presented only with written task statements. It is not clear how much information about the tasks might have been lost because the analysts did not actually observe or perform the tasks. This situation is realistic, however, in that engineers and managers must initially design jobs that, by definition, do not yet exist to be observed. Also, although this is an unverified assumption, the tasks evaluated in this study do not seem so complex that analysts would find them hard to envision from a written description. Furthermore, if the analysts had performed the jobs, their ratings of task design might have been influenced by their knowledge of task interdependence and similarity, thus creating a confound in the study.

Fifth, many other variables besides task features may explain variance in incumbent perceptions of motivational job design. For example, social information has been found to influence perceptions of job design (e.g., O'Reilly & Caldwell, 1979; Salancik & Pfeffer, 1977). Individual differences in growth need strength have been found to reliably moderate job design–outcome relationships (e.g., Fried & Ferris, 1987; Loher et al., 1985), and such differences might also influence perceptions of job design. Even though differences in importance and time spent on tasks between incumbents did not influence the results, there could be other subtle differences between jobs with the same title that might influence perceptions of motivational job design (e.g., differences in management behaviors; Griffin, 1983). Finally, even though substantial convergence can be obtained between incumbents, managers, and analysts on measures of motivational job design, especially at the job level of analysis (e.g., Campion, 1988; Campion & McClelland, 1991), convergence may not always be high, especially at the individual incumbent level of analysis (e.g., Spector & Jex, 1991).

Future Research

Future research might explore different approaches to the measurement of the new task level constructs. For example, the use of more extensive and more detailed task statements and analysts more familiar with the actual tasks may influence the results.

A true experimental test of the proposed model could also be conducted. We did not manipulate the task level measures and thus did not directly test the impact of different combinations of tasks on the motivational designs of jobs. A more direct test would be to have workers actually perform different (and experimentally manipulated) combinations of tasks. The challenge will be the creation of realistic combinations of tasks that can be manipulated independently.

Finally, future research could abandon the original model and focus on the inverted-U curve relationship between task interdependence and motivational job design observed in this study. The generalizability of this relationship and its implications in other settings and types of jobs could be investigated. Future studies could also examine whether the nature of interdependence changes with different levels of complexity. For example, interdependence may mean sequential tasks for simple jobs, whereas it may mean integration and interaction among tasks for more complex jobs.

Regardless of specific direction, researchers should continue to explore the relationship between relatively objective task attributes and employees' subjective perceptions of and reactions to the motivational value of jobs.

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