EFFECTIVE GOALS FOR COMPLEX TASKS: TOWARDS A BROADER CONCEPTUALIZATION OF SPECIFIC-DIFFICULT GOALS

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A key finding of goal theory is that specific-difficult goals, i.e., quantitative goals which are challenging to the individual, lead to improved performance. However, recent research suggests that these goals are ineffective for highly complex tasks such as managerial jobs. This paper argues that if a broader conceptualization of specific-difficult goals is adopted, then specific-difficult goals will be seen to improve the performance of complex tasks.

Difficult quantitative goals improve task performance by providing a precise definition of the desired outcome; the individual therefore considers only a few strategies for dealing with the situation. When the assigned task is of low to moderate complexity, this leads to improved performance. On a highly complex task, however, such a goal leads to the selection of an inferior action plan and, therefore, to reduced performance.

A highly complex task requires the individual to consider the relative importance of various goals and to choose the best strategy for achieving the selected goal or goals. Consequently, an effective goal for such tasks will both provide a precise definition of the desired outcome and encourage the individual to consider a broad variety of action plans.

This paper proposes that a goal system is an effective type of specific-difficult goal for a highly complex task. A goal system is a goal hierarchy which includes both a superordinate goal (or goals) and subgoals. The superordinate goal defines the individual's primary objective(s). Subgoals may specify particularly desirable features of the superordinate goal, identify several steps towards the superordinate goal as separate goals, or describe other desirable but less critical goals. Thus, subgoals increase the specificity with which the superordinate goal is defined thereby increasing the individual's goal comprehension.

The superordinate goal identifies non-optional goals while subgoals are presented as optional objectives. Because the subgoals are presented as optional goals, the individual is more likely to consider a broad variety of action plans. The superordinate goal then serves as a template against which the possible strategies can be evaluated.

A research project which measures the relative effectiveness of quantitative and non-quantitative goal systems versus simple quantitative goals and do-your-best goals in both a simple and a complex version of a managerial task is proposed. The project also includes measurement of the key cognitive processes which determine goal effectiveness. No previous study has included multiple types of goals, two levels of complexity, and the key cognitive steps in the process by which goals influence performance. This study therefore provides a more complete test of a model of the process by which goals influence performance than is currently available.

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Introduction

Statement of the Problem

A key finding of goal theory is that specific-difficult goals, i.e., quantitative goals which are challenging to the individual (Locke, Shaw, Saari, & Latham, 1981), are more effective than vague do-your-best goals in improving performance; this has been confirmed by research in both laboratory and field settings (Latham & Lee, 1985; Mento, Steel, & Karren, 1987; Tubbs, 1986). However, a recent meta-analysis demonstrates that specific-difficult goals are decreasingly effective in improving performance as task complexity increases, although usually still significant (Wood, Mento, & Locke, 1987). Additionally, for some highly complex heuristic tasks specific-difficult goals even lead to poorer performance than a non-specific do-your-best goal (Earley, Connolly, & Ekegren, 1989; Huber, 1985). This suggests that specific-difficult goals may be ineffective or counterproductive for managerial tasks. If that is true, then we have lost a potentially valuable tool for improving managerial performance; goal theory is widely recognized as one of the most useful theories in organizational behavior (Miner, 1984; Pinder, 1984; Schneider, 1985; Staw, 1984).

This paper argues that specific-difficult goals are relevant to improving the performance of complex tasks, even heuristic managerial tasks. The problem is the operationalization of specific-difficult goals, not the theory. Goal theory virtually always operationalizes specific-difficult goals as quantitative goals. This has happened because most of the research on goals has been done with simple tasks (Huber, 1985; Locke et al. 1981) or tasks of only moderate complexity (Locke Chah, Harrison, & Lustgarten, 1989); quantitative goals are highly effective for such tasks. However, goals do not have to be quantitative to be difficult or specific. Goal difficulty is defined as
the extent to which the goal is challenging to the individual (Locke et al. 1981) or the probability that the individual will achieve the goal (Naylor & Ilgen, 1984). Goal specificity is defined as the explicitness or clarity with which the desired outcome is defined (Locke & Latham, forthcoming; Locke et al. 1989; Naylor & Ilgen, 1984). Thus, it is legitimate to use an alternative operationalization of specific-difficult goals.

Naylor and Ilgen (1984) propose that there are two types of goal specificity. One type of goal specificity is quantitative specificity (i.e., the degree of quantitative precision with which the level of performance of the desired outcome is defined); however, another type of goal specificity is content or outcome specificity (i.e., the explicitness with which the content of the desired outcome is defined). For example, the goal of writing two publishable papers a year is specific with regard to both quantity and content. The goal of writing publishable papers is specific with regard to content but is not specific regarding quantity. The goal of making two scientific contributions a year is specific with regard to quantity but is not specific regarding the content of the goal (Naylor & Ilgen, 1984). Although there is a substantial body of research on the effect of quantitative specificity on task performance, there is little consideration of the effect of content specificity on performance (exceptions include Campbell & Gingrich, 1986; Earley 1985, 1986; Erez & Arad, 1986). This paper therefore discusses how content specificity influences the performance of simple versus complex tasks.

Design of the Paper and Proposed Research

The paper does this by considering two operationalizations of specific-difficult goals. One operationalization is called a simple goal; this includes both the traditional type of quantitative specific-difficult goal and vague do-your-best goals (henceforth these will be referred to as simple quantitative goals and
simple non-quantitative goals, respectively). The second operationalization is a goal system which includes a superordinate goal plus subgoals (Bandura, 1988). The paper supports the selection of this operationalization by discussing the characteristics of effective goals for complex tasks and by reviewing current theory and research on the cognitive processes by which specific-difficult goals influence performance. The paper hypothesizes that simple goals will lead to superior performance on a simple task, but that goal systems will lead to better performance on a complex task. The paper supports these hypotheses with hypotheses about the effect of simple goals versus goal systems on each of the steps1 in the process by which goals influence performance.

The paper then proposes a research project to measure the effect of the two types of goals on overall performance and on the steps in the process by which goals influence performance for both simple and complex tasks. Thus, the approach is consistent with the dictum that:

Any theory that describes a process responsible for a given effect (be it motivational or cognitive) must attempt to demonstrate this intervening process in addition to the effect... (Bavelas & Lee, 1978, p. 226).

Contribution of the Paper

This project will represent a particularly valuable contribution to the literature since research on the process is limited (Bandura & Cervone, 1983; Locke et al. 1981; Mento et al. 1987; Riedel Nebeker, & Cooper, 1988; Steers & Porter, 1987; Wood et al. 1987; Wood & Locke, forthcoming). Although many researchers have studied one of the steps in the process by which goals influence performance, only a handful of studies have considered two steps (see Table #1), and no study has attempted to measure all of the steps in the process. Additionally, few studies have included tasks at more than one level

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1 These steps are generally described as goal comprehension, goal acceptance, and action or strategy planning (Locke, 1968; Locke et al. 1981; Wood and Locke, forthcoming).
of complexity (for exceptions see Table #2).

Furthermore, although this paper is primarily concerned with the effect of content specificity on task performance, the study design includes both quantitative traditional specific-difficult goals and non-quantitative do-your-best goals. These are necessary to provide evidence that the simple task is simple and that the complex task is complex. Since these are included, the study also includes both quantitative and non-quantitative versions of a goal system. The study therefore also contributes to our knowledge of the way in which quantitative specificity influences task performance.

This paper is intended to lead to a broader conceptualization of specific-difficult goals. The proposed research will increase our knowledge of the relative effectiveness of two types of specific-difficult goals on the performance of simple and complex tasks. It will also provide a more complete test of one model of the process by which goals influence performance than is currently available.

**Literature**

This section discusses the key cognitive processes by which simple quantitative goals lead to improved performance of tasks of low to moderate complexity. The section then discusses why these processes, and therefore such goals, are less effective for complex tasks. The section argues that a goal system which includes both superordinate goals and relevant subgoals (i.e., subgoals which relate the superordinate goal to the source of task complexity) will lead to improved performance of complex tasks.

**Task Complexity and the Effectiveness of Simple Specific Goals**
By definition, simple specific goals are goals with high content specificity. Such goals provide a precise definition of the content of the desired outcome (Naylor & Ilgen, 1984) thus focussing the individual’s attention on a narrow range of possible actions (Wood and Locke, forthcoming). This leads to improved performance of simple tasks. For example, if a widget maker has been successfully meeting the goal of producing 12 widgets per hour, that individual is likely to continue using the approach which has been successful in the past. If someone were to ask the widget maker why he/she always used the same approach, the widget maker might shrug and say: "If it ain’t broke, don’t fix it." In the short run at least, the widget maker is making the correct decision. If the widget maker were to look for a better approach, performance would initially suffer because the time used in experimenting with different approaches would be unavailable for making widgets.

Performance of a complex task, however, is improved by a broader consideration of action plan possibilities. Task complexity is defined by the extent to which the task possesses one or more of the following attributes: multiple components (including acts and information cues), high coordination needs, and dynamic or uncertain conditions (Wood, 1986). As the complexity of the task increases, it is decreasingly possible to predict the relationship between an action and its consequence. Therefore, the performance of a highly complex task is improved by having an individual with relevant specialized knowledge decide on an appropriate action plan (Carroll & Tosi, 1973; Perrow, 1970; Wood & Locke, forthcoming). When the individual considers many options or engages in extensive planning, the quality of these choices improves (Janis and Mann, 1977).

These points are supported by a study done by Hackman, Brousseau, and Weiss (1976) concerning the effect of time spent planning on both simple and
complex tasks. In this experiment performance was measured by the dollar value of all components assembled by a group of students. In the simple condition, all subjects knew what components the group was expected to assemble. Thus, each subject could independently decide what components to produce in order to maximize the dollar value of the group's production. In the high complexity condition, however, each subject knew only some of the components which were requested. Production of the most profitable components therefore required coordination. The experimenters found that on the simple task time spent planning hurt performance. On the complex task, however, time spent planning improved performance. This suggests that different types of goals will lead to superior performance on simple versus complex tasks. Specifically, goals which lead to reduced planning should be associated with superior performance on simple tasks; on complex tasks, however, goals which lead to increased planning should be associated with improved performance.

In the example of the widget maker we saw that a simple specific goal is unlikely to lead the widget maker to look for a new production method or to engage in planning. (This point is discussed in greater detail below.) Simple specific goals lead to a reduced consideration of options and therefore decrease the individual's ability to make good choices in complex situations. Goal theory therefore needs to identify a different type of goal for complex situations.

Goal theory makes two different suggestions of what constitutes an appropriate goal for a complex task. Sometimes, goal theorists suggest that

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2 Because this paper is concerned with the effect of content specificity on the performance of complex tasks, it does not discuss the effect of quantitative specificity. In the interest of completeness, however, a brief discussion is included in Appendix #1.
vague goals may lead to better performance of complex tasks than specific challenging goals:

Under [some circumstances] (e.g., managing in an uncertain environment) vague goals could conceivably be more effective than specific goals in that the manager would have more flexibility in responding to environmental contingencies (Locke et al. 1989, p. 272).

However, while vague goals give the individual flexibility, they do not define the desired outcome. This may create problems because different individuals may have different understandings of the organization's goal (or goals); this may lead to poor coordination and inefficiency as each individual pursues the project which in his or her judgment is of greatest importance. Several people may perform one task while other tasks are left undone.

Goal theorists also suggest that multiple quantitative goals lead to improved performance in some situations. The effectiveness of such goals has been demonstrated for proofreading tasks (Ilgen and Moore, 1987), for salesclerks (Ivancevich, 1976; Kim, 1984), highly skilled technicians (Ivancevich 1977; Ivancevich and McMahon, 1977a, 1977b, 1977c, 1982; Pritchard, Jones, Roth, Stuebing, and Ekeberg, 1988), and materiel handling and storage units (Pritchard et al. 1988). Multiple goals lead to improved performance of such tasks because they increase the individual's awareness of a number of specific objectives and suggest action plans which are appropriate for each objective. However, these jobs are less complex than middle level managerial jobs. Managers frequently need to choose between two different objectives where achieving one objective precludes achievement of the other objective. Multiple goals may indicate the various tasks which are to be performed; they do not, however, provide information about the relative importance of the various tasks.

Therefore, what is needed is a type of goal which specifically defines one or more desired outcomes and indicates their relative importance. This goal should stimulate the creation of a new action plan by increasing the individual's
awareness of his/her freedom to select a course of action and contributing to the individual's ability to consider multiple factors and objectives in creating an appropriate action plan\(^3\).

**Goal Systems**

A goal system can lead to improved performance of complex tasks because it defines the desired outcome while simultaneously identifying areas within which the individual has discretion. A goal system includes one or more superordinate or overarching goals and multiple subgoals. The superordinate goal defines the individual's primary objective(s). Subgoals may specify particularly desirable features of the superordinate goal, identify several steps towards the superordinate goal as separate goals, or describe other desirable but less critical goals. For example, the superordinate goal may be to clean the house and subgoals may include dusting and making beds. In this example the subgoals can be thought of either as means by which the superordinate goal is accomplished or as additional specification as to the definition of a clean house. Alternatively, the superordinate goal might be to clean the house and an additional but unrelated subgoal might be to rearrange a vase of flowers. Thus, subgoals can help to clarify the superordinate goal and to identify the relative importance of other goals.

The presence of multiple goals does not necessarily create a goal system. Multiple goals become a goal system only when there is a clearly identifiable superordinate goal and, therefore, a goal hierarchy. It is the hierarchical nature of the goal system which enables it simultaneously to provide clear specification of the desired outcome and flexibility regarding selection of the means by which that outcome is to be achieved. The superordinate goal is a

\(^3\) Ideally, such a goal will do this without leading to excessive arousal.
non-optional goal which identifies the individual's primary objective(s). Subgoals identify less critical but desirable outcomes; these represent the individual's area of discretion.

A goal system is particularly effective when the subgoals relate the superordinate goal to the factors which make the situation complex. This focuses the individual's attention on the source of task complexity thereby leading to an improved choice of actions. For example, the job of an air traffic controller is complex because of component complexity (e.g., fuel availability, multiple runways, and landing order), coordinative complexity (e.g., coordinating the plane's landing with that of other planes which are advised by other controllers), and dynamic complexity (e.g., wind rate, wind direction, and the plane's position in the holding pattern) (Wood, 1986). Clearly, the controller's superordinate goal is the prevention of accidents. Ideally, subgoals will increase the controller's awareness of all three types of complexity, thereby leading to a broader consideration of options and, consequently, to improved performance.

A superordinate goal can be an individual goal or an organizational goal. When the superordinate goal is an individual goal, then the goal system is a hierarchical individual goal system as described by Lord & Kernan (1987) and Newell & Simon (1972). Goal systems with superordinate organizational goals and individual level subgoals have been described by Carroll & Tosi (1973), Cyert & March (1963), Drucker (1989), March & Simon (1958), and Quinn (1980). Both kinds of goal systems are thought to lead to improved performance. The next section discusses some of the processes by which goal systems improve the performance of complex tasks.

Hypothesized Relationships among Task Complexity, Goal Type.
and the Steps by which Goals Influence Performance

This section discusses a model of the major steps by which goals influence performance. It argues that goal systems lead to improved performance of complex tasks because they combine superordinate goals with subgoals. Bandura states that superordinate goals "... give purpose to an activity and serve a general directive function, but subgoals are better suited to serve as the proximal determinants of specific choice of activities and how much effort is devoted to them" (1988, p. 50). This section describes how these two functions improve the goal comprehension and action planning of complex tasks. Conversely, the section argues that goal systems provide superfluous information which may hinder goal comprehension and action planning for simple tasks; simple quantitative goals are hypothesized to lead to improved performance of simple tasks.

Scope of the Model

The model is concerned with the process by which externally imposed goals, such as those assigned by employers to employees, influence the initial understanding and, therefore, the performance of cognitive tasks by experienced employees. It is a highly simplified model (as shown below), which includes only the key cognitive processes by which specific goals influence the performance of cognitive tasks.

[Insert Figure 1 about here]

The model in Figure 1 omits the effect of goals on effort. This is an appropriate choice because effort is considered to be of less importance in

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4 Wood et al. (1987) state that it is possible that there are significant differences in the process by which goals influence the performance of cognitive versus psychomotor tasks.
influencing the performance of cognitive as compared with psychomotor tasks (Wood and Locke, forthcoming). This is a limited model intended to facilitate a discussion of the process by which goals influence the performance of cognitive tasks.

The model is designed to clarify the initial steps by which goals influence performance. It therefore assumes that each step of the process precedes the next step and it omits all feedback loops. These simplifying assumptions do not interfere with our ability to consider the influence of detailed goals on the four steps. The model is not appropriate, however, for considering the way that goals influence the individual's persistence (Locke & Latham, forthcoming; Locke et al. 1981), assist the individual in refining an action plan (Campion & Lord, 1982), or serve as guides in verifying the appropriateness of the action plan (Bandura, 1986).

The model offers the benefits of being easily comprehended because it excludes all interactions, processes, and variables which are not directly relevant to considering the effect of goal systems versus simple goals on the performance of cognitive tasks. Thus, the model is parsimonious. Pfeffer (1982) argues that parsimonious theories are preferable to complex theories:

The criterion of parsimony means that theories that are simpler in their explanations, presuming fewer causal variables and more simple causal mechanisms (e.g., direct effects rather than multiple interactions), should be preferred, other things being equal (p. 39).

This paper therefore uses the simple model presented in Figure 1.

**Step 1: Goal Comprehension**

Before a goal can influence performance, it must be comprehended (Locke, 1968). An experiment by Bavelas & Lee (1978) demonstrates that simple quantitative goals influence goal comprehension by providing information which defines the task. In this experiment subjects were shown 50 cards: one card
had a 15 x 15 mm square drawn on it, the other 49 cards had parallelograms which increasingly deviated from the square. The subjects were then asked to find the 5, 15, 25, 35, or 45 cards with squares drawn on them. The experimenters found that the subjects selected the specified number of figures, gradually relaxing the definition of a square, as the specified goal increased. This shows that the goal influenced the subjects' understanding of what the experimenters meant by a square.

A simple task is one that is familiar to the individual who has been asked to perform it, or one that requires only a few decisions. For such a task, subgoals may decrease the person's understanding of the superordinate goal. For example, a widget maker may perform only a few repetitious tasks in a predictable environment. Since the tasks are repetitious, the widget maker does not need to think about the steps by which the task is performed. Such specification of the steps will certainly increase the time required for the widget maker to comprehend the goal; the widget maker will need to think about each individual step before determining what the goal actually is. Specification of the steps may even suggest that the goal is unfamiliar and therefore inhibit the widget maker's ability to recognize the goal as being familiar. Conversely, the use of a simple goal would instantly indicate that the goal is a familiar one. Furthermore, since the environment is predictable, this widget maker does not need to think about the necessity of coordinating with others; the standard procedures do all the coordination necessary. Goals which relate the widget maker's task to the tasks of others may confuse the widget maker as to his/her precise responsibilities. Finally, goals which relate the widget maker's task to environmental contingencies, such as the possibility of problems with obtaining the necessary materials, may lead the widget maker to wonder: "Should I obtain the necessary materials, or wait for them to be
brought to the work station?" This suggests that:

Hypothesis #1 - For a simple task, simple goals lead to better goal comprehension than do goal systems.

Conversely, it may not be clear to the individual performing a complex task just what the goal is; for such a task, a goal system provides information which can increase the individual's goal comprehension. Subgoals explicitly focus the individual's attention (Bandura, 1988; Locke et al. 1981) on a group of desirable objectives. This can help to clarify the superordinate goal.

For example, the air traffic controller's superordinate goal may specify that the goal is plane safety. Subgoals can clarify this objective by noting that the controller determines whether it is safe to use the scheduled airport. A simple goal would omit the clarifying subgoal; the air traffic controller might, therefore, think that the superordinate goal was plane safety at the assigned airport. Thus, subgoals may lead to a better understanding of the superordinate goal.

Additionally, because a goal system is hierarchical, it is considered a schema (Foti & Lord, 1987; Lichtenstein & Brewer, 1980; Lord & Kernan, 1987), i.e., a framework for systematizing information (Abelson, 1981; Brewer & Treyens, 1981). This framework increases the amount of knowledge which the individual can store (Anderson & Pichert, 1978; Chase & Ericsson, 1982). Schemas can include both information which has been explicitly related to the framework (i.e., formally presented goals and subgoals), and information which has not been explicitly related to the framework (i.e., inferred goals) (Bower, Black, & Turner, 1979; Lord & Kernan, 1987). Schemas therefore improve comprehension (Foti & Lord, 1987; Lichtenstein & Brewer, 1980). Since a goal system is a schema, it should lead to improved goal comprehension.

This suggests:

Hypothesis #2 - For a complex task, goal systems lead to better goal comprehension.
comprehension than do simple goals.

[Insert Figure 2 about here]

Step 2: Goal Acceptance

Goal comprehension does not necessarily lead to performance; an individual may comprehend a goal and yet decline to work for it. This is most likely to happen when the individual believes that he/she is unlikely to succeed in reaching the goal (Erez & Zidon, 1984; Locke, Latham & Erez, 1988); the probable failure may appear less painful if it is possible to say: "I never really intended to do that."

Specific-difficult goals influence goal acceptance by contributing to the individual's understanding of the goal and ability to select an appropriate strategy. When the individual understands the task, his/her self-efficacy increases (Earley, 1986); this leads to increased goal acceptance (Earley, 1985). Similarly, goals which increase the individual's ability to select an appropriate strategy will lead to increased self-efficacy and, therefore, to increased goal acceptance. However, specific-difficult goals also influence goal acceptance by influencing the individual's estimate of the difficulty of achieving the goal. As the perceived difficulty of the goal increases, the individual's self-efficacy decreases (Bandura & Wood, 1989); this should lead to decreased goal acceptance (Wood, Bandura, & Bailey, in press). The net effect of goal type on goal acceptance is, therefore, the result of two potentially conflicting tendencies. Clearly, it is possible for these two effects to cancel each other out.

For a simple task, a simple goal is hypothesized to lead to better goal acceptance.
comprehension than a goal system; this implies that simple goals should lead to increased goal acceptance. A goal system, however, provides additional information; in some circumstances this information might lead the individual to perceive the task as being less difficult and therefore lead to increased goal acceptance. This may explain why research shows both that information has no effect on goal acceptance (Campbell & Gingrich, 1986; Earley, 1985 - for subjects with assigned work strategies; Erez & Arad, 1986) and that information increases goal acceptance (Earley, 1985 - for subjects who were permitted to select their preferred work strategy).

Thus, it is unclear whether a simple goal or a goal system will lead to higher goal acceptance for simple tasks. Resolution of this question requires testing two competing hypotheses:

Hypothesis #3a - For a simple task, simple goals lead to higher goal acceptance than do goal systems.

Hypothesis #3b - For a simple task, goal systems lead to higher goal acceptance than do simple goals.

For a complex task, goal systems have been hypothesized to provide information which leads to increased goal comprehension. Since goal comprehension is thought to be an important determinant of self-efficacy and, therefore, of goal acceptance, goal systems should lead to increased goal acceptance for complex tasks. This hypothesis is supported by Earley (1985), who found that providing additional information increased goal acceptance of subjects who were asked to perform complex versions of the scheduling and cleaning tasks, whether or not they had control over their choice of work strategies.

It is also possible, however, that goal systems will lead to lower goal acceptance.

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6 The research design also includes measurement of self-efficacy and perceived goal difficulty.
acceptance for a complex task. We have seen that goal systems provide
information which increases the individual's awareness of the need to choose
between several competing goals. This may lead to an increase in perceived
goal difficulty. Since goal acceptance is decreased by goal difficulty (Erez &
Zidon, 1984), this suggests that goal systems may lead to lower goal
acceptance than simple goals.

This is also an unresolved question which requires testing two competing
hypotheses.

Hypothesis #4a - For a complex task, goal systems lead to higher goal
acceptance than do simple goals.

Hypothesis #4b - For a complex task, simple goals lead to higher goal
acceptance than do goal systems.

Step 3: Action or Strategy Planning

Once the individual has accepted the goal, he/she forms or selects an
action plan. Wood and Locke (forthcoming) propose that there are two kinds of
task-specific action plans: stored action plans and new action plans. When an
individual understands a task and performs it repeatedly (i.e., when the
individual is experienced at performing the task), that individual develops a
habitual strategy (i.e., a stored action plan) for performing that task. A new
action plan is created either when the individual combines several stored action
plans in a new way or when the individual invents a new approach to
accomplishing the task (Wood & Locke, forthcoming).

On a simple task, stored action plans lead to improved performance (Wood
and Locke, forthcoming). Wood and Locke point out that: "In the case of a
simple repetitive task or goal, such as driving downtown to pick up the dry
cleaning, one hardly needs to think of a plan of action at all in order to
perform it." (forthcoming, p.2). A familiar or stored action plan is executed
with a minimum of effort while a new action plan requires considerable effort. (Consider trying to write a letter or brush your teeth with the hand you do not usually use.) I therefore postulate, as do Wood and Locke (forthcoming), that on a simple task, the use of a stored action plan leads to better performance than the creation and use of a new action plan.

A highly complex task, however, requires the creation of a new action plan. A task is complex because it has multiple objectives and because there are a large number of potentially appropriate actions for achieving those objectives. The choice of an appropriate action is influenced by multiple information cues and/or high coordination needs and/or dynamic conditions (Wood, 1986). Thus, it is impossible to specify in advance what constitutes an appropriate action plan. I therefore postulate that the performance of highly complex tasks is improved by the use of new action plans.

A simple goal specifies the desired outcome and omits mention of complicating factors. It therefore implies that the present situation is a familiar situation and that the desired outcome is a familiar outcome. A simple goal also implies that a known approach has previously produced satisfactory results and that this approach is anticipated to continue producing satisfactory results. If this were not the case, then a more complete set of goal communications would presumably be used. Thus, a simple goal increases the individual's tendency to use a stored action plan (see Figure 2). Wood and Locke call this the cueing effect. They say: "Specific [i.e., simple] goals may have a priming effect which leads to the selection of a particular STSP [stored task specific plan] (pp. 28-29)." For example, if the widget maker has been successfully meeting the goal of making 12 widgets an hour, that individual is unlikely to consider other procedures; the widget maker will tend to use a proven approach. Thus, simple goals tend to lead to decreased planning or consideration of
options and to increased use of stored action plan (Wood and Locke, forthcoming).

Goal systems aid in the development of a new plan. Inclusion of multiple subgoals increases the number of action plan possibilities which the individual considers because each subgoal needs to be addressed by an action plan. When these subgoals are both specific and familiar, they remind the individual of stored action plans (Wood & Locke, forthcoming), thus potentially increasing the appropriateness of the included stored action plans. When the subgoals are unfamiliar, the individual does not have a stored action plan; unfamiliar subgoals therefore force the individual to select or develop new action plans (Wood & Locke, forthcoming).

Then, assuming that the individual understands that the key determinant of performance is achievement of the superordinate goal, all of these action plans will be evaluated for their effect on the superordinate goal. Any plans which are incompatible with the achievement of the superordinate goal would be discarded. Here the goal system serves as a template against which to judge the appropriateness of the various possibilities.

Because the goal system is a schema, it helps the individual to design an overall action plan. A schema provides a framework which encourages the individual to look at the overall set of desired objectives and the associated action plan possibilities. This framework then enables the individual to select an appropriate group of action plan possibilities without consciously considering each possibility (Alba & Hasher, 1983; Cantor & Mischel, 1979; Dutton & Jackson, 1987). Thus, a goal system increases the possibility that the individual will find an effective plan which simultaneously accomplishes multiple objectives.

Since performance of a simple task is anticipated to be improved by the
use of a stored action plan, and since the performance of a complex task is anticipated to be improved by the use of a new action plan, this suggests:

Hypothesis #5 - For a simple task, simple goals lead to a more appropriate action plan than do goal systems.

Hypothesis #6 - For a complex task, goal systems lead to a more appropriate action plan than do simple goals.

Outcome: Performance

We have hypothesized that for a simple task, goal comprehension and action planning are improved by the use of simple goals. We have said that it is unclear whether simple goals or goal systems will lead to higher goal acceptance. However, most studies have found that goal acceptance shows little variance; therefore, goal acceptance generally has a relatively small effect on performance (Garland, 1984; Locke et al. 1981; Locke et al. 1988). Therefore, assuming that we compare quantitative simple goals with quantitative goal systems and non-quantitative simple goals with non-quantitative goal systems, we can hypothesize that:

Hypothesis #7 - For a simple task, simple goals lead to better performance than do goal systems.

We have hypothesized that goal systems lead to better goal comprehension and action planning than simple goals. Since the performance of a complex task is thought to be primarily influenced by goal comprehension and action plan development (Wood & Locke, forthcoming) this suggests that goal systems lead to improved performance of complex tasks.

Research has shown that information about the task is particularly effective in improving the performance of a complex task (Campbell & Gingrich, 1986; Earley 1985, 1986; Erez & Arad, 1986). Since goal systems provide the individual with more information than do simple goals, goal systems should lead to better performance than simple goals. Additional support for this hypothesis
comes from the schema literature. Theorists suggest that performance of a complex task is related to the quality of the individual's decisions (Carroll & Tosi, 1973; Perrow, 1970; Quinn, 1980; Smith, Locke, & Barry, forthcoming). Since goal systems are schemas and since schemas lead to improved decision making (Lurigio & Carroll, 1985), goal systems should lead to improved decision making and therefore to improved performance of complex tasks. We therefore hypothesize:

Hypothesis #8 - For a complex task, goal systems lead to better performance than do simple goals.

Methodology: Experimental Design

I propose to test these hypotheses by conducting an experiment in which task complexity and goal type are independently manipulated. It is advantageous to use an experiment because it permits the creation of two distinctly different goal types; a field study would provide far less control over the goal communications during the study. Additionally, in a field situation, goal comprehension is influenced by previous experiences and previous goal communications.

Criteria for Selection of Experiment

The experiment needs to be appropriate for use with both simple goals and goal systems. This implies that the simple task should be straightforward, so that subjects can rapidly develop an appropriate stored action plan. Conversely, there should not be a clearly identifiable correct approach for performing the complex task; each trial should require evaluation of multiple objectives or changing conditions. Only on tasks with this degree of complexity is performance hypothesized to be improved by the use of a goal system.
Additionally, in order to test the eight hypotheses, it must be possible to measure goal comprehension, goal acceptance, the quality of the action plan, and overall performance.

Description of Proposed Experiment

I have permission to use a revised version of a computer simulation, initially developed by Wood and Bailey (1985), which satisfies these criteria. In this simulation the subjects take the role of managers with responsibility for restoring furniture in the Special Order Department. Restoration work requires multiple production functions such as: milling timber, assembling parts, and upholstering.

The subject makes four types of decisions on each trial:

1. **Assignment of workers to production functions.** Descriptions of production function requirements and employee skills, experience, motivational level, preference for routine versus challenging work, and standards of work quality are provided.

2. **Assignment of production targets.** Choices are: no target set, do your best, target set at estimated time, target set 25% easier than estimated time, target set 25% harder than estimated time.

3. **Feedback.** Four choices are possible: no feedback, tell the worker the actual hours in relation to the estimated hours, discuss working methods but not reveal the actual time taken, discuss both the time taken and the reasons for it.

4. **Social rewards.** Three options are possible: no reward, compliment the employee on performance, post a memo in the lunchroom acknowledging the worker’s contribution.

On each trial, the subject assigns workers to production functions and selects a production target for each worker. The computer then informs the subject of the time taken by each worker to complete the assigned function and the total time taken by the unit to complete the production order. The subject then determines the type of feedback and reward each worker will receive.

The model uses assumptions based on Locke's goal setting theory (Wood &
Bailey, 1985). For example: Goals which represent a moderate challenge lead to higher performance than no goals or instructions to do your best. However, continued use of goals that are not attainable reduces performance after two trials. Instructive feedback improves performance for employees who are performing below standard; however, use of high instructive feedback for employees who are above standard, reduces performance. Social rewards improve performance when there is an equitable ratio of rewards to attainments for that employee compared with the equivalent ratio for other employees.

The complexity of the simulation is varied through the production order and employee roster which are given to the subject at the beginning of each trial. A simple simulation involves only three employees, each of whom is unambiguously suited to one of three production jobs. Conversely, there are eight employees and eight production jobs in the complex condition, and the roster is designed so that there is not an unambiguously superior set of assignments.

Suitability of the Simulation

The experiment is appropriate for use with both simple goals and goal systems. Wood, Bandura, and Bailey (in press) found that a simple quantitative goal improved subjects' performance in the simple condition. In the complex condition, however, the researchers found that quantitative and non-quantitative goals led to equivalent performance. This suggests that the experimental task with eight production functions is sufficiently complex that a goal system should lead to improved performance. Additionally, the task is designed so that a subject needs to consider the interaction of multiple factors in making decisions. For example: Should a poor performer with extensive prior experience be given instructive feedback? Will high performers become
demoralized if low performers receive equivalent recognition? Conversely, will low performers be increasingly demoralized if they do not receive recognition? 

I propose that a goal system can improve performance on such a task.

The performance measure appears to be credible. The model has been used in a number of previous experiments (Bandura & Wood, 1989; Wood & Bandura, 1989; Wood, Bandura, & Bailey, in press) which are producing interpretable results. Additionally, all three studies measure the quality of the action plan by the number of trials on which the subject changes only one factor. This measure has produced interpretable results and will be included. It is possible, however, that the goal manipulation will lead this measure to be ineffective (see below for a discussion); a new measure of action plan appropriateness will therefore be included. Goal comprehension will be measured by self report; this has previously been done by French, Kay, and Meyer (1966) and Latham and Steele (1983).

All subjects receive identical orientation to their role in the experiment:

The Special Order Department operates on a weekly cycle. All special orders which are received by noon on Friday are produced in the following week. Each Friday afternoon you receive a Job Requirements Manifest and a memo from your manager (these will appear on the screen). The Job Requirements Manifest shows the estimated person-hours in each job category required to complete the special order for the following week. You will also receive a roster of workers available to work on the Special Order production line for the following week. As the Special Order Manager you must determine the allocation of personnel from the Special Order Roster to specific jobs, on the basis of personnel available, their skills, and the job requirements.

Subjects also receive identical information about the relationships between the four variables:

The actual time an employee takes to complete a job depends in part on the match between the employee's abilities and the skill requirements of the job, and in part on the employee's motivation to do the job well. Employee abilities and job skill requirements cannot be changed in the short term, but motivation can be affected to some extent by the way in which you set production targets, by the nature of the feedback about past performance that you provide to the employee, and by your allocation of rewards.
Goals

The experiment will be run in both simple and complex conditions with four types of goals:

- simple goal - non-quantitative, i.e., do your best
- simple goal - quantitative,
- goal system - non-quantitative, and
- goal system - quantitative.

[See Figure 3]

Subjects receive identical orientation to their goal assignments:

Although the estimated hours are sometimes realistic, both you and your manager recognize that they are often quite inaccurate. Your manager therefore assigns you what he believes to be a realistic goal in a memo which accompanies the Job Requirements Manifest.

The statement about the possible inaccuracy of the estimated hours is included to increase the apparent validity of the assigned quantitative goals.

Subjects then receive goal assignments which relate to the experimental condition to which they have been assigned. The goal statement for the simple non-quantitative goal subjects (cells 1 and 5) will say:

The memo says that your goal is to fill the orders in as few person-hours as possible.

The goal statement for subjects in the simple quantitative goal condition (cells 2 and 6) will say:

The memo says that your goal is to fill the orders in 75% of the estimated time or less.

The goal statement for subjects in the non-quantitative goal system condition (cells 3 and 7) will say:

The memo says that your goal is to fill the orders in as few person-hours as possible. Your manager reminds you that productivity will be enhanced if, in addition to the productivity goal, your objective on each trial is to:
1. improve the degree to which employees are assigned to jobs which are appropriate to their interests and skills,
2. increase employees' expectations that increased effort will lead to better performance, and
3. increase employees' expectations that improved performance
leads to rewards.

The goal statement for subjects in the quantitative goal system conditions (cells 4 and 8) will say:

The memo says that your goal is to fill the order in 75% of the estimated time or less. Your manager reminds you that productivity will be enhanced if, in addition to the productivity goal, your objective on each trial is to:

1. achieve a score of 75% or better for the appropriateness with which employees are assigned to jobs relative to their interests and skills,
2. achieve a score of 75% or better for the strength of employees' expectations that increased effort will lead to better performance, and
3. achieve a score of 75% or better for the strength of employees' expectation that improved performance leads to rewards.

Subjects

This experiment has been shown to be effective with business school graduates (Wood & Bandura, 1989) and graduate students (Wood, Bandura, & Bailey, in press). It is therefore possible to include both graduate students and managers in the sample.

I intend to run the experiment with 15 subjects per cell. This number of subjects should be sufficient to obtain statistically significant results.

Manipulation Checks

Initial self-efficacy and ability will be measured to test the equivalence of the sample. The self-efficacy of the subjects will be measured before they receive any orientation to either experiment. Their ability will be measured by having all subjects play a practice round (one week only) of a particularly simple version of the game prior to receiving any goal. The initial self-efficacy and ability of the subjects in the eight goal conditions should be equal.

After the goal is assigned but before the subjects begin the game, questions will appear on the computer screen regarding the subject's self-
efficacy and perception of goal difficulty. This will measure the effect of the
goal on the individual’s self-efficacy. Self-efficacy and perceived goal difficulty
will be measured again halfway through the experiment; these measures will
reflect the joint effect of the goal and the individual’s experience on the
individual’s self-efficacy and perception of goal difficulty.

The self-efficacy question will be the one which has been used in previous
studies (Bandura & Wood, 1989; Wood & Bandura, 1989; Wood, Bandura, & Bailey,
in press). This measure describes nine possible levels of production efficiency
for the Special Order Department ranging from 30% faster than the estimated
time to 40% slower. Subjects are asked to rate the strength of their
confidence that they can attain each goal level on a 10 point scale where 0
represents no confidence and 9 equals total confidence. Self-efficacy is the
sum of their confidence scores for all nine levels.

Perceived goal difficulty will be measured with a question used by Yuckl
and Latham (1978):

We are interested in your perception of the difficulty of the goal which
your manager specified in his memo. The memo said that your goal was to
[repeat goal statement].

How difficult do you think your goal is?

Yuckl and Latham found that this question was not correlated with any of
three performance measures; it therefore appears to measure perceived goal
difficulty, not subjective probability of success which generally correlates with
performance (e.g., Meyer, Schacht-Cole, & Gellatly, 1988; Motowidlo, Loehr, &
Dunnette, 1978; Yuckl & Latham, 1978). Subjects will be asked to rate goal
difficulty on a 9 point scale.

Tests of Hypotheses

Hypothesis #1 - For a simple task, simple goals lead to better goal
comprehension than do goal systems.
After the goal is assigned but before the subjects begin the game, subjects will be asked to evaluate their goal comprehension. Goal comprehension will be measured with slightly modified versions of five questions used by Latham and Steele (1983). Subjects will be asked to rate the degree of their agreement with each statement on a 9 point scale.

1. I am confident that I understand the instructions for this simulation.
2. I am confident that I understand my role in the simulation.
3. I am confident that I know how to go about doing the task.
4. My assigned goal is clear.
5. I know what I am accountable for on this task.

Latham and Steele obtained an alpha of .75 for this scale. This suggests that the scale measures a single construct. Question number three, however, appears to be more related to action planning than to goal comprehension. It is therefore possible that this question will be eliminated from the scale.

The hypothesis will be most strongly supported if the average goal comprehension of the simple quantitative goal subjects (cell 2) is greater than that of the quantitative goal system subjects (cell 4), and if the average goal comprehension of the simple non-quantitative goal subjects (cell 1) exceeds that of the non-quantitative goal system subjects (cell 3). (Goal comprehension in cell#: 1>3 and 2>4.)

The hypothesis will also be supported if the average goal comprehension of the simple goal subjects (cells 1 and 2) exceeds the average goal comprehension of the goal system subjects (cells 3 and 4). (Goal comprehension in cells: (1+2) > (3+4).)

The hypothesis will be partially supported if simple goals improve the goal comprehension of either the quantitative goal subjects or the non-quantitative goal subjects, but not both groups of subjects. (Goal comprehension of cell#: 1>3 but 2≤4, or, 2>4 but 1≤3).
Hypothesis #2 - For a complex task, goal systems lead to better goal comprehension than do simple goals.

Goal comprehension will be measured in the same way that it was measured for Hypothesis #1. This hypothesis will be most strongly supported if the average goal comprehension of the non-quantitative goal system subjects (cell 7) is greater than the average goal comprehension of the simple non-quantitative goal subjects (cell 5), and the average goal comprehension of the quantitative goal system subjects (cell 8) is greater than the average goal comprehension of the simple quantitative goal subjects (cell 6). (Goal comprehension cell#: 7>5 and 8>6.)

The hypothesis will also be supported if the average goal comprehension of the goal system subjects (cells 7 plus 8) exceeds the average goal comprehension of the simple goal subjects (cells 5 plus 6). (Goal comprehension cell #: \((7+8) > (5+6)\).)

The hypothesis will be partially supported if goal systems improve the goal comprehension of only the quantitative goal subjects or of only the non-quantitative goal subjects. (Goal comprehension in cell#: 7>5 but 8\(\leq\) 6, or, 8>6 but 7\(\leq\)5.)

Hypothesis #3a - For a simple task, simple goals lead to higher goal acceptance than do goal systems.

Hypothesis #3b - For a simple task, goal systems lead to higher goal acceptance than do goal systems.

Goal acceptance will be measured after subjects have tried the preliminary round of the game (i.e., the ability control), the goal is assigned, and they have reported their perceptions of goal difficulty. Thus, goal acceptance will be based on some experience with the game. Additionally, because they will just have answered questions about their perception of goal difficulty, it may be possible to obtain more variance in goal acceptance than is customary.

Goal acceptance will be measured with a slightly modified three item scale
used by Erez and Arad (1986) (Cronbach's alpha = .83).

1. (Commitment to a goal means acceptance of it as your own person goal and your determination to attain it.) I am committed to attaining the goal that was set.
2. It is important to me to at least attain the goal that was set.
3. I will strive to attain the goal that was set.

Subjects will be asked to rate the degree to which they agree with these statements on a 9 point scale. Goal acceptance will also be measured a second time halfway through the game.

The same pattern of responses that supports Hypothesis #1 will support Hypothesis #3a. The pattern of responses that disconfirms Hypothesis #1 will support Hypothesis #3b.

Hypothesis #4a - For a complex task, goal systems lead to higher goal acceptance than do simple goals.

Hypothesis #4b - For a complex task, simple goals lead to higher goal acceptance than do goal systems.

Goal acceptance will be measured in the same way that it was measured for Hypotheses #3a and #3b. The same pattern of responses that supports Hypothesis #2 will support Hypothesis #4a. The pattern of responses that disconfirms Hypothesis #2 will support Hypothesis #4b.

Hypothesis #5 - For a simple task, simple goals lead to a more appropriate action plan than do goal systems.

Action planning will be measured in several ways. First, as in previous studies (Bandura & Wood, 1989; Wood & Bandura, 1989; Wood, Bandura, & Bailey, forthcoming), action planning will be measured by the average number of trials on which subjects change only one factor (i.e. production function, goal level, feedback, or social reward) for an individual employee. Wood and his associates argue that subjects who engage in hypothesis testing by changing only one factor on a trial, learn more about the effect of each factor on the employee. All three studies found that subjects' performance was positively associated with the number of trials on which subjects changed only one factor. This suggests
that this represents an appropriate action plan. The same pattern of results which will support Hypothesis #1, will support this hypothesis.

Nevertheless, it is possible that this measure will fail to produce the anticipated result because the goal systems may increase subject's task understanding sufficiently to reduce subjects' need for hypothesis testing (Wood, personal communication). The experiment will therefore include some new measures of the appropriateness of the action planning process. These new measures will be based on subjects' evaluation of the relative effectiveness of various strategies after they have finished playing the game. These responses will be analyzed to see whether certain strategies are more strongly associated with superior performance than other strategies. If such differences are found, the responses will be analyzed to see whether the subjects in the different goal conditions employed different strategies. If that is the case, the same pattern of results which will support Hypothesis #1, will support this hypothesis. (A copy of the proposed questions can be found in Appendix #1.)

Hypothesis #6 - For a complex task, goal systems lead to a more appropriate action plan than do simple goals.

Action planning will be measured in the same way that it was measured for Hypothesis #5; the same pattern of results which will support Hypothesis #4, would support this hypothesis.

Hypothesis #7 - For a simple task, simple goals lead to better performance than do goal systems.

On every trial, a subject's goal is expressed in relation to the hours required to complete the production order, and the simulation estimates the number of hours which would be required to complete the production order. Subjects' performance will, therefore, be measured by the model's estimate of the number of personhours which would be required to complete the production order. As with the previous hypotheses, the same pattern of results which will
support Hypothesis #1, will support this hypothesis.

**Hypothesis #8 - For a complex task, goal systems lead to better performance than do simple goals.**

Performance will be estimated by the model. The same pattern of results which will support Hypothesis #2 will support this hypothesis.

**Contribution of the Research**

**Theoretical**

We know very little about the attributes which make goals effective for complex tasks (Locke et al. 1989; Wood et al. 1987). This research project will advance our knowledge of goal attributes which lead to improved performance of simple versus complex tasks.

The study will also produce data which can be used to compare the process by which goals influence the performance of simple versus complex tasks. The study does this by measuring the effect of goals on three of the steps, goal comprehension, goal acceptance, and action planning, by which goals influence performance, in both a simple and a complex task. Table #1 provides a list of the studies which measure more than one step in the process by which goals influence performance.

Table #1 provides a list of the studies which measure two of the mechanisms, i.e., effort and planning. This is appropriate because effort and planning, although correlated, make independent contributions to performance (Earley et al. 1987).

I categorize effort as part of the action planning step because I think that after an individual decides on the degree to which he/she accepts a goal, the individual then considers how to achieve the goal. Effort is one potential tool for achieving a goal, however, the individual may choose other strategies. This may explain why Mento, Cartledge, & Locke (1980) found that effort was unrelated to goal acceptance.
reader will note that only the Wood, Bandura, and Bailey (in press) study appears in both tables. This study therefore represent a significant increase in such knowledge.

This data will be used to begin to consider questions such as: the degree to which goal comprehension, goal acceptance, and action planning explain the process by which goals influence performance; the relative importance of these steps in simple versus complex situations; and the effect of each step on the other steps.

The study may also remind other researchers of the value to be gained from including measurement of more of the relevant mechanisms in their studies. This would lead to a rapid expansion of our knowledge of the process by which goals influence performance.

Practical

At an applied level I anticipate that completion of this study will increase organizations' ability to obtain excellent performance on complex tasks. The study will do this by increasing our knowledge of the attributes which are associated with effective goals for complex tasks. This knowledge can then lead to the use of more appropriate goals for individuals, and hence to increased organizational performance.

Individuals will also benefit from this study. Since success breeds success (Berlew & Hall, 1966; Feather, 1966, 1968), individuals who have once been more successful because of the use of appropriate goals will have increased capacity for future successes. Thus, if goal systems increase the individual's effectiveness, this will lead to an increased sense of self-efficacy (Bandura, 1982). This increased self efficacy will lead to improved performance (Bandura, 1982; Bandura & Wood, 1989; Locke, Frederick, Lee, & Bobko, 1984; Sales, 1970;
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APPENDIX 1

THE EFFECT OF QUANTITATIVE SPECIFICITY ON THE PERFORMANCE OF COMPLEX TASKS

If this paper were to discuss the process by which quantitative goals influence performance, it would note that quantitative specificity defines the desired level of performance; this tells the individual how much effort and persistence is needed to achieve the goal (Locke et al. 1981). Quantitative goals generally lead to improved performance for tasks of low to moderate complexity. On tasks of high complexity, however, difficult quantitative goals appear to put excessive pressure on the individual for immediate performance. This may lead to excessive arousal which interferes with the cognitive processes involved in action planning (Bandura & Wood, 1989; Humphreys & Revelle, 1984).

For example, Huber (1985) found that subjects who were given a difficult quantitative goal on a complex maze problem were more aroused than subjects who were given easy goals. These subjects with difficult quantitative goals viewed the overall maze more frequently than did subjects with easy or vague goals, even though such viewing was penalized. They also required more moves to solve the puzzle than did the subjects with easy goals. Huber therefore concludes that the difficult quantitative goal led to increased arousal and therefore to an inferior action plan and reduced performance.
APPENDIX 2

PROPOSED QUESTIONS FOR MEASURING TYPE OF ACTION PLAN

GAME REVIEW - QUESTION 1.

During the course of the simulation you may have tried a variety of strategies. Please answer the following questions in regard to those strategies which you tended to use during the second half of the game.

Please rank the following tasks in the order in which you performed them. Thus, the task which you performed first should be given a 1, the task which you performed second should be given a 2, and so forth. Tasks which you did not consciously perform should be given an n.a. (not applicable).

In assigning workers to tasks, the first thing I did was to:

Select employees for the most difficult tasks ___.
Select employees for the tasks which were estimated to require the most hours ___.
Fill the tasks for which one particular employee was clearly the most suited ___.
Assign a worker to the first task on the production order___.
Assign the first employee on the roster to a task___.

Subjects will also be asked to report their perceptions of the relative importance of the various tasks.

GAME REVIEW - QUESTION 2

The order in which people perform tasks does not necessarily correspond to the importance of the various tasks. Please rate the tasks on a scale from 0 to 9 according to your estimate of their influence on the personhours required to complete a production order. (A task which you believe to have no effect on production efficiency would be rated 0; a task with the greatest effect possible would be rated 9.)

The following ratings reflect my perception of the tasks' importance in determining the number of personhours needed to complete a production order.

Select employees for the most difficult tasks ___.
Select employees for the tasks which were estimated to require the most hours ___.
Fill the tasks for which one particular employee was clearly the most suited ___.
Assign a worker to the first task on the production order___.
Assign the first employee on the roster to a task___.

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GAME REVIEW - QUESTION 3.
(I know these are tedious. Please bear with me.)

Please rate the relative effectiveness of the following GOAL strategies on the overall performance of the Special Order Department. (Use even numbers if your reaction falls between levels).

1 = Significantly Decreases Performance.
3 = Somewhat Decreases Performance.
5 = No Effect on Performance.
7 = Somewhat Increases Performance.
9 = Significantly Increases Performance.

1. Assigning difficult (i.e., 75% of standard) goals to most or all employees ___.
2. Assigning average (i.e., estimated) goals to most or all employees ___.
3. Assigning do-your-best goals to most or all employees ___.
4. Assigning easy (i.e., 125% of standard) goals to most or all employees ___.
5. Not setting goals for most or all employees ___.
6. Setting difficult goals for good performers ___.
7. Setting difficult goals for poor performers ___.
8. Setting difficult goals for experienced workers ___.
9. Setting do-your-best goals for good performers ___.
10. Setting do-your-best goals for poor performers ___.

GAME REVIEW - QUESTION 4
(This is the next to last screen.)

Please rate the relative effectiveness of the following FEEDBACK strategies on the overall performance of the Special Order Department. (Use even numbers if your reaction falls between levels).

1 = Significantly Decreases Performance.
3 = Somewhat Decreases Performance.
5 = No Effect on Performance.
7 = Somewhat Increases Performance.
9 = Significantly Increases Performance.

1. Providing feedback to most or all employees ___.
2. Discussing production (but not providing feedback) with most or all employees ___.
3. Providing feedback and discussing production methods with most or all employees ___.
4. Not providing feedback or discussing production methods with most or all employees ___.
5. Discussing production methods with new employees only ___.
6. Discussing production methods with poor performers only ___.
7. Discussing production methods with good performers only ___.
8. Providing feedback to good performers only ___.
9. Providing feedback to poor performers only ___.
10. Providing feedback to experienced workers only ___.
GAME REVIEW - QUESTION 5
(Last screen! Thank you.)

Please rate the relative effectiveness of the various REWARD strategies on the overall performance of the Special Order Department. (Use even numbers if your reaction falls between levels).

1 = Significantly Decreases Performance.
3 = Somewhat Decreases Performance.
5 = No Effect on Performance.
7 = Somewhat Increases Performance.
9 = Significantly Increases Performance.

1. Providing no rewards to any employees ___.
2. Providing moderate rewards to most or all employees ___.
3. Providing high rewards to most or all employees ___.
4. Providing high rewards to good performers ___.
5. Providing high rewards to average performers ___.
6. Providing high rewards to poor performers ___.
7. Providing high rewards to good performers, moderate rewards to average performers, and no rewards to poor performers ___.

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<thead>
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<th>Study</th>
<th>Goal Comprehension</th>
<th>Goal Acceptance</th>
<th>Action Plan or Strategy</th>
<th>Causal Analysis</th>
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<td>Bandura &amp; Wood, 1989</td>
<td></td>
<td>Self-set goals</td>
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<td>Chesney &amp; Locke, working paper</td>
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<td>Self report, analysis of choices</td>
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<td>Planning, Effort</td>
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<td>Goal commitment</td>
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<td>McCaul, Hinsz, &amp; McCaul, 1987</td>
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<td>Mento, Cartledge, &amp; Locke, 1980</td>
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<td>Motowidlo, Loehr, &amp; Dunnette, 1978</td>
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<td>Neale, Northcraft, &amp; Earley, working paper</td>
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<td>Steers, 1975</td>
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</tr>
<tr>
<td>Baumler, 1971</td>
<td>Resource Allocation game- minimal versus extensive interdependence</td>
<td>Performance, number of messages, type of messages, coordination, teamwork</td>
<td>Subgoals improved performance of simple task only. Subgoals reduced communication.</td>
<td></td>
</tr>
<tr>
<td>Campbell &amp; Gingrich, 1986</td>
<td>Field study - programming</td>
<td>Performance, perceived goal difficulty, goal acceptance, perceived task difficulty</td>
<td>Participation improved performance of complex task only</td>
<td></td>
</tr>
<tr>
<td>Campbell &amp; Ilgen, 1976</td>
<td>One, two, and three move chess problems</td>
<td>Number solved, number attempted, goal difficulty</td>
<td>Early experience on complex task led to better performance</td>
<td></td>
</tr>
<tr>
<td>Earley, 1985</td>
<td>1) Scheduling task, unrestricted versus 3 restrictions. 2) Animal care, with versus without record keeping</td>
<td>Information about task importance and methods, choice of strategy and work breaks, goal acceptance, personal goal, performance</td>
<td>Information influenced goal acceptance and had an effect on performance. Information had greater effect on performance of complex task. Choice only improved performance with information</td>
<td></td>
</tr>
<tr>
<td>Earley, Hanson, &amp; Lee, 1986</td>
<td>Field study - complexity f(clarity, variety, # of strategies, outcome contingencies)</td>
<td>Performance, planning, goal specificity and difficulty, Type A personality</td>
<td>Complexity did not moderate effect of goals on performance, but did moderate effect of goals on planning.</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Performance</td>
<td>Complexity</td>
<td>Results</td>
</tr>
<tr>
<td>-------</td>
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<tr>
<td>Earley, Lee, &amp; Hanson, 1989</td>
<td>Reanalysis of Earley, Hanson, and Lee, 1986</td>
<td>Performance, goal specificity and difficulty, job experience, job level</td>
<td>On a complex task, goal setting improved the performance of experienced workers</td>
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<tr>
<td>Frost &amp; Mahoney, 1976</td>
<td>Identification of wrong word in reading passage. Jigsaw puzzle.</td>
<td>Performance, goal specificity, goal difficulty, goal acceptance, performance interval frequency</td>
<td>Quantitative goals led to better performance on puzzle.</td>
<td></td>
</tr>
<tr>
<td>Hirst, 1988</td>
<td>Resource allocation task, minimal versus extensive interdependence</td>
<td>Goal specificity, task order, intrinsic motivation</td>
<td>Quantitative goal increased motivation for simple task, decreased motivation for complex task.</td>
<td></td>
</tr>
<tr>
<td>Jackson &amp; Zedeck, 1982</td>
<td>1) Model building, Lego - one model versus five models. 2) Estimation of carpet for floor plan - simple versus complex calculation</td>
<td>Goal level, evaluation context, task order, performance, satisfaction, task perception, effort (measured, not reported: no effect on performance)</td>
<td>1) Goal level did not influence performance on either simple or complex task. 2) Goal level influenced performance on both simple and complex task.</td>
<td></td>
</tr>
<tr>
<td>Wood, Bandura, &amp; Bailey, in press</td>
<td>Managerial simulation - 3 versus 8 production functions</td>
<td>Goal level, self-efficacy, goal acceptance, self set goal, analytic strategy, performance</td>
<td>Goal level did not affect performance of complex task.</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1
A Simplified Model of the Key Cognitive Processes by Which Goals Influence Performance

- Externally Imposed Goal
- Goal Comprehension
- Goal Acceptance
- Action or Strategy Planning
- Performance
FIGURE 2

HYPOTHESIZED STRENGTH OF RELATIONSHIPS AMONG TASK COMPLEXITY, GOAL TYPES AND STEPS BY WHICH GOALS INFLUENCE PERFORMANCE

Simple Task

<table>
<thead>
<tr>
<th>SIMPLE GOAL</th>
<th>GOAL SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
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</tbody>
</table>

GOAL COMPREHENSION

- Perceived goal difficulty
- Self-efficacy

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GOAL ACCEPTANCE

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<tr>
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<th>?</th>
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</thead>
</table>

USE OF STORED ACTION PLAN

| BETTER PERFORMANCE |

Complex Task

<table>
<thead>
<tr>
<th>SIMPLE GOAL</th>
<th>GOAL SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
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GOAL COMPREHENSION

- Perceived goal difficulty
- Self-efficacy

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GOAL ACCEPTANCE

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</thead>
</table>

USE OF STORED ACTION PLAN

| POORER PERFORMANCE |

CREATION OF NEW ACTION PLAN

| POORER PERFORMANCE |

BETTER PERFORMANCE

Note:* * * indicates a weak relationship

—— indicates a strong relationship

? ? ? indicates an unknown relationship

Note: The distinction between use of stored action plans and creation of new action plans is attributable to a model by Wood and Locke (forthcoming...
FIGURE 3
RESEARCH DESIGN

<table>
<thead>
<tr>
<th>Goal Type</th>
<th>SIMPLE GOAL</th>
<th>GOAL SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Quantitative</td>
<td>Quantitative</td>
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<tr>
<td>SIMPLE</td>
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<td>2</td>
</tr>
<tr>
<td>COMPLEX</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Non-Quantitative</td>
<td>Quantitative</td>
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<tr>
<td>SIMPLE</td>
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<td>4</td>
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<tr>
<td>COMPLEX</td>
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