The effects of budget goals and task interdependence on the level of and variance in performance: a research note

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Abstract

The effects of goal setting and task interdependence on both the level of and variance in performance are examined using a laboratory, resource allocation task. The results show, consistent with existing research, main effects for goal setting and task interdependence on the level of performance, but no goal setting by task interaction effect as hypothesised. The results also show that an increase in task interdependence increases performance variance but that goal setting reduces it with important implications for budget setting.

Budget goals are frequently claimed to increase the level of task performance. Underpinning this claim is a large body of evidence which shows that setting specific, difficult goals generates higher performance than setting specific moderate goals, specific easy goals or general (i.e. 'do-your-best') goals (Chow, 1983; Hirst & Lowy, 1990; Rockness, 1977; Stedry & Kay, 1966). Additionally, evidence shows that goals promote performance by increasing motivation (i.e. the direction and level of effort) as well as stimulating the search for, and consistent use of, relatively effective task strategies (Earley, Connolly & Ekegren, 1989; Locke & Latham, 1990). Building on this literature, research has started to examine the boundary conditions for the motivational effects of goals on the level of performance. Evidence suggests that task characteristics, in particular, task complexity, moderates the relation between goals and performance; as task complexity increases, goals are less effective in promoting performance (Campbell, 1988; Earley et al., 1989; Wood, Mento & Locke, 1987). Here we extend this literature in two ways. First, following the work of Thompson (1967), we operationalise task complexity in terms of task interdependence, namely, pooled and reciprocal task interdependence. Second, while existing research on goal setting has been principally concerned with its influence on the level of performance, here we extend the theoretical framework to also examine the effect of both goal setting and task interdependence on the variance in performance.

The motivation for focusing on the moderating effects of task interdependence is threefold. First, by so doing we are able to test a dimension of task complexity, moderates the relation between goals and performance; as task complexity increases, goals are less effective in promoting performance (Campbell, 1988; Earley et al., 1989; Wood, Mento & Locke, 1987). Here we extend this literature in two ways. First, following the work of Thompson (1967), we operationalise task complexity in terms of task interdependence, namely, pooled and reciprocal task interdependence. Second, while existing research on goal setting has been principally concerned with its influence on the level of performance, here we extend the theoretical framework to also examine the effect of both goal setting and task interdependence on the variance in performance.

1 In terms of Wood's (1986) review, varying task interdependence is tantamount to varying “coordinative complexity”; and in terms of Bonner's (1994) review, this is equivalent to varying “process complexity”.

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complexity that has not been examined in previous goal setting studies (Weingart, 1992). Second, this focus allows us to test the theoretical work by Hirst (1987) who identifies task interdependence as a potential moderator of the relation between budget goals and the level of task performance. Specifically, Hirst suggests that the beneficial effects of goals are less (more) likely where tasks involve reciprocal (pooled) interdependence. Third, knowledge about moderator variables can have practical implications. In this regard, our focus on task interdependence is particularly appropriate because reciprocal interdependence is a common feature of many organisations. More generally, this focus is timely given the emergence of teams and other management interventions that highlight the interdependence among individuals and work groups (Safizadeh, 1991; Young, Fisher & Lindquist, 1993).

There are two reasons for focusing on the variance in performance. First, an analysis of performance variance (and specifically, causal or antecedent conditions) is central to our understanding of alternative roles that budget goals play in organisations. Recall that, in addition to the motivational role of budget goals, they are also used for performance evaluation, coordination and learning. Importantly, the first two roles require task performance to be reasonably predictable (i.e. require low performance variance), while the last is needed where performance is unpredictable (Govindarajan, 1984; Simons, 1990). The present analysis is important because it has the potential for developing propositions about the contingent use of budget goals. Second, there is an emerging view in the literature that managers are just as concerned with influencing performance variance as they are with influencing the level of performance (Merchant & Manzoni, 1989; Reeve, 1990; Taguchi & Clausing, 1990). Accordingly, an analysis of factors that impact performance variance has the potential for providing additional mechanisms (e.g. goal setting) that can assist managers in performing their role.

To investigate these issues, we use a multi-person, resource allocation task, in a laboratory setting. We begin by developing hypotheses about the determinants of performance level and variance. This is followed by a description of the research method and the presentation and discussion of the results. In brief, and in contrast with recent empirical findings and the predictions by Hirst (1987), the results show that task interdependence does not moderate the effects of budget goals on the level of performance. Budget goals promote performance on both low (pooled) and high (reciprocal) interdependent tasks. In addition, and as expected, the results show that task interdependence and goal setting do affect the variance in performance. Our findings are used both to critique prior goal setting studies, and given the performance-variance results, to speculate about the contingent use of budget goals for the purposes of coordination and motivation. Lastly, our results are used together with other findings in the literature, to reconcile the apparent conflict between the goal setting literature, which prescribes setting specific, difficult goals, and the finding that profit-centre managers are set specific, achievable goals (Merchant & Manzoni, 1989).

1. Hypothesis development

Hirst (1987) suggests that two propositions are central to the argument about the way in which task interdependence moderates the motivational effects of budget goal setting. First, the beneficial effects of goal setting are conditional on the completeness of task knowledge. Without such knowledge, individuals may develop ineffective action plans which, in turn, may result in misdirected effort and subsequently, lower performance. Second, task interdependence has a negative effect on the completeness of task

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2 While accounting studies have focussed on Thompson’s (1967) notion of task interdependence in examining several issues about control system design, none examine goal setting effects. In an experimental study, Chow et al. (1991) found a marginally significant interaction between task interdependence and budget-based incentive schemes affecting performance. Macintosh and Daft (1987) and Fisher (1994) have viewed task interdependence as a contingency variable affecting the design of accounting control systems.
knowledge. With pooled interdependence, goals and feedback provide additional task knowledge which can be used to establish the most efficient way to perform such tasks. In comparison, the acquisition of task knowledge for reciprocally interdependent tasks is more difficult, because task outcomes are influenced by the actions of others. Modelling this influence is difficult (and, at the limit, not possible) because the actions of others are often unobservable and unknown.

In addition, modelling reciprocally interdependent tasks is difficult because some of the consequences of own actions are unobservable and/or unknown (March & Olsen, 1976; Merton, 1936). Formally stated:

H1: The level of task performance is a function of the interaction between goal setting and task interdependence.

Specifically, the positive effect of goal setting in task performance decreases as the level of task interdependence increases.

Hypothesis One (H1) is an extension to a well-researched area in which a large number of studies has supported the general finding that goal setting increases the level of task performance (e.g. Locke & Latham, 1984, 1990). However, few of these studies have been concerned with the predictability of, or variance in, the performance increase. Exceptions are the works by Locke and his associates which report a positive correlation between goal level (actual difficulty) and the variance in performance (Locke, 1982; Locke & Latham, 1984; Locke, Chah, Harrison & Lustgarten, 1989). We extend this limited literature on goal setting and variance in performance by arguing that increases in task interdependence increase performance variance.

Above, we argue that incomplete task knowledge results in the development of ineffective strategies and, hence, low performance. In addition, however, incomplete task knowledge may increase problems associated with the coordination of interdependent tasks. That is, in a reciprocally interdependent task, there is considerable uncertainty regarding the effects of others' behaviour on own behaviour and vice versa, and regarding the resultant effects on performance. Given this uncertainty, assumptions have to be made concerning task behaviour and outcomes in the face of incomplete task knowledge. Where these assumptions are in error, unreliable budgets are set and as a consequence, the variance in performance increases. Such assumptions about the impact of others on own behaviour are unnecessary for pooled interdependent tasks. It follows, therefore, that reciprocally interdependent tasks are characterised by problems of coordination and, hence, higher variance in performance. Formally stated:

H2: Performance variance is a positive function of task interdependence.

While the main effect of task interdependence on performance variance is positive, the main effect of goal setting is hypothesised to be negative. The basic tenet of goal setting is that "there is a linear relationship between degree of goal difficulty and performance" (Locke & Latham, 1990, p. 27). In which case, different subjects would not improve their performance by the same amount under goal setting. For example, a person who, under a general goal, would perform well below a specific difficult goal, would increase their performance more under that difficult goal, than would a different person who, under the same general goal, performed close to the difficult goal. It follows in general, that if the level of performance is a linear function of the distance of the performance under a general goal from the budget goal, then goal setting would reduce the variances of the performance. Formally stated:

H3: Performance variance is a negative function of goal setting.

2. Research methods

2.1. Subjects, tasks and variables

The subjects were 64 managers, all of whom were university graduates. Sixty-one subjects held
commerce degrees, 56 of which were at the postgraduate level. The mean age of the subjects was 32.9 years (S.D. = 7.3); there were 17 females and 47 males.

The experimental task involved a resource allocation task in two simulated chemical production plants that converted gas input into chemical product. Three individuals, a research assistant and two subjects, operated each plant. The research assistant acted as the general manager, and the two subjects acted as managers. The general manager allocated gas input to both sections of a plant. Each manager, using information about the operating characteristics of their own production facilities, subsequently allocated the gas to the machines in their facilities. The experiment examined the way goal setting and task interdependence affected the managers’ allocation decisions and, therefore, the production level of the chemical output.

The research design manipulates four variables: goal setting, task interdependence, task order and trials. Task interdependence and trials were within subjects (repeat) factors. Subjects were randomly allocated to the do-your-best and specific, difficult goal treatments. Do-your-best goals were operationalised as “produce as much final chemical as possible” and specific, difficult goals were set at a level that was achieved by 20% of the do-your-best subjects. Task interdependence was manipulated by having each subject work on two plants (tasks), one involving pooled interdependence and the other, reciprocal interdependence. The order of exposure to tasks was varied randomly across subjects. As discussed by Hirst (1987), the two forms of task interdependence were created by varying the production functions of the chemical converters. In the pooled interdependent task condition, the two managers independently operated sections of the chemical plant, with chemical output from each section being a simple function of gas input for the section. One manager’s operations did not affect the other’s performance. In the reciprocal interdependent task condition, the two managers operated linked sections of the plant, in which the chemical output from each section depended in part on the input of some intermediate chemical from the other manager’s converter. Thus the output achieved by each manager was partly determined by the other manager’s allocation decisions. Learning and experience effects were controlled by having managers produce output over five trials on each of the chemical plants (pooled and reciprocal interdependent tasks.)

Task performance was measured in terms of the amount of final chemical output produced in each plant. However, output was not directly comparable across the two types of plant because their production functions differed to some extent. There were also five different gas input levels for each of the five trials, with the order of these five input levels randomly varied across subjects. Comparability of output levels, both between plants and across input quota, was achieved by calculating the maximum possible output for a given input quota, and expressing the performance achieved as a percentage of that optimal level of performance. The unit of analysis for measuring task performance was not the output of chemical product for each manager. Instead, we used the output of each pair of managers on each trial. This ensured consistency between plants, as the managers’ performance in the reciprocal interdependent plant were jointly determined. Similarly, the variance in performance was computed across each pair’s performance (n = 16) within each of the twenty cells defined by the goal (2) × task interdependence (2) × trial (5) treatments.

There are two ways goal setting has been operationalised in the literature. First, as a continuous variable, by manipulating the difficulty level of goals (e.g. Chow, 1983). Under this approach, all budget goals are specific (i.e. expressed in quantitative terms). The second and more frequent approach, which is adopted in this study, involves operationalising goal setting as a dichotomous variable (e.g. Baumer, 1972). This is achieved by establishing, on the one hand, a general goal (such as “do-your-best”) and on the other hand, a specific, difficult goal. Both approaches assume that there is commitment to (i.e. acceptance of) the goals.

Each section in a plant had two converters which transformed gas input into chemical output.

Production functions were described in equation form as well as in graphs and tables showing the output expected from different levels of input. Equivalent production data was provided on the two plants.
2.2. The experimental procedure

Each pair of subjects operated the plant for five simulated days. A simulated day proceeded as follows:

1. the general manager (research assistant) distributed allocation forms that showed the amount of raw material gas available to a given manager (subject) for that day;
2. in the goal condition, the general manager established specific goals for each manager on the allocation forms;
3. each manager made their allocation decision on the allocation form and returned it to the general manager;
4. the production of the intermediate and final chemicals was determined and posted on a large board in view of both managers by the general manager; and,
5. in the goal condition, goal attainment was noted on the production board.

After operating the first plant for 5 days, the subjects completed a questionnaire about the stress associated with performing their tasks, the general strategy they employed, and the extent to which they perceived their goals as being specific, difficult, and acceptable. Following a 15 minute break, the above procedure was repeated for the second plant. Finally, each subject completed a questionnaire that provided information about their age, gender and academic qualifications. Typically, each experimental session took between three, and three and a half hours.

2.3. Analysis

The experimental design was a \(2 \times 2 \times 2 \times 5\) factorial design with equal cell sizes and a random allocation of subjects to treatment conditions. Within this design, level of performance was modelled using repeated measures MANOVA. Testing the significance of the interaction between task interdependence and goal setting provides a test of H1.

H2 and H3 (performance variance is a function of task interdependence and goal setting, respectively) are tested within an ANOVA framework. To do this, performance standard deviation is modelled as a function of task interdependence and goals, while controlling for possible different learning effects across trials for the two tasks.

3. Results

Table 1 reports the description statistics for mean performance and standard deviation by goal setting, task interdependence and trial. Tables 2 and 3 present the statistics for testing H1, H2 and H3. The results in Table 2 do not support H1. The interaction between goal setting (G) and task interdependence (TI) is not significant (GxTI: \(F = 0.15\), \(df = 1,28\), NS). Consistent with the general finding in the goal setting literature, Table 2 reports a main effect for the goal setting treatment (G: \(F = 4.45\), \(df = 1,28\), \(p < 0.05\)). In addition to the goal main effect, there is a main effect for TI shown in Table 2 (TI: \(F = 18.1\), \(df = 1,28\), \(p < 0.05\)). There is a negative relationship between task interdependence and task performance. Finally, Table 2 reports both a trial (T) main effect (T: \(F = 15.49\), \(df = 1,28\), \(p < 0.05\)) and a task interdependence by trial interaction (T x TI: \(F = 9.89\), \(df = 1,28\), \(p < 0.05\)).

When both main and interaction effects are present, they cannot be interpreted independently of each other. To clarify the findings reported in Tables 1 and 2, Fig. 1 illustrates the combined effect of the above significant findings by plotting the mean level of performance across trials for

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7 Analysis of the questionnaire data showed that, for each task, subjects who were assigned budget goals perceived them to be specific, difficult and acceptable. This analysis is available, on request, from the authors.

8 Using MANOVA implies that each contrast is tested against its own error term. This avoids the need to make the sphericity assumption (i.e. the assumption of symmetrical covariance matrices) which is required by conventional univariate tests (Boik, 1981). In general, the sphericity assumption is rarely justified (Harris, 1994) and, in particular, would not hold under H2 and H3 above.
Table 1
Mean performance and standard deviations by goal setting, task interdependence and trial

<table>
<thead>
<tr>
<th>Trial</th>
<th>No goals (n = 16)*</th>
<th>Goals (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td><strong>High interdependent task</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>81.3</td>
<td>15.8</td>
</tr>
<tr>
<td>2</td>
<td>84.2</td>
<td>15.4</td>
</tr>
<tr>
<td>3</td>
<td>89.8</td>
<td>11.1</td>
</tr>
<tr>
<td>4</td>
<td>89.6</td>
<td>12.5</td>
</tr>
<tr>
<td>5</td>
<td>95.0</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>Low interdependent task</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>94.3</td>
<td>3.9</td>
</tr>
<tr>
<td>2</td>
<td>94.5</td>
<td>4.4</td>
</tr>
<tr>
<td>3</td>
<td>93.3</td>
<td>3.8</td>
</tr>
<tr>
<td>4</td>
<td>92.7</td>
<td>5.4</td>
</tr>
<tr>
<td>5</td>
<td>95.5</td>
<td>2.9</td>
</tr>
</tbody>
</table>

* Number of observations per cell.

Table 2
MANOVA summary for task performance

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal setting (G)</td>
<td>1</td>
<td>750.28</td>
<td>4.45</td>
<td>0.05</td>
</tr>
<tr>
<td>Order of task</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interdependence (OT)</td>
<td>1</td>
<td>10.97</td>
<td>0.06</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (G×OT)</td>
<td>1</td>
<td>204.99</td>
<td>1.21</td>
<td>NS</td>
</tr>
<tr>
<td>Error</td>
<td>28</td>
<td>168.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task interdependence (TI)</td>
<td>1</td>
<td>3595.91</td>
<td>18.11</td>
<td>0.05</td>
</tr>
<tr>
<td>Interaction (G×TI)</td>
<td>1</td>
<td>29.16</td>
<td>0.15</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (OT×TI)</td>
<td>1</td>
<td>58.34</td>
<td>0.29</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (G×OT×TI)</td>
<td>1</td>
<td>253.71</td>
<td>1.28</td>
<td>NS</td>
</tr>
<tr>
<td>Error</td>
<td>28</td>
<td>198.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial (T)</td>
<td>1</td>
<td>1350.81</td>
<td>15.49</td>
<td>0.05</td>
</tr>
<tr>
<td>Interaction (G×T)</td>
<td>1</td>
<td>28.38</td>
<td>0.32</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (OT×T)</td>
<td>1</td>
<td>5.07</td>
<td>0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (G×OT×T)</td>
<td>1</td>
<td>64.33</td>
<td>0.74</td>
<td>NS</td>
</tr>
<tr>
<td>Error</td>
<td>28</td>
<td>87.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Task interdependence by trial (TT=TI×T)</strong></td>
<td>1</td>
<td>1211.18</td>
<td>9.89</td>
<td>0.05</td>
</tr>
<tr>
<td>Interaction (G×TT)</td>
<td>1</td>
<td>35.41</td>
<td>0.29</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (OT×TT)</td>
<td>1</td>
<td>3.90</td>
<td>0.03</td>
<td>NS</td>
</tr>
<tr>
<td>Interaction (G×OT×TT)</td>
<td>1</td>
<td>136.58</td>
<td>1.11</td>
<td>NS</td>
</tr>
<tr>
<td>Error</td>
<td>28</td>
<td>122.46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
both the task interdependence and goal setting treatments. The lines are the linear trends over trials. Fig. 1 shows that performance is (1) a positive function of goal setting for both levels of task interdependence, (2) over trials, performance level increases for reciprocal but is constant for pooled interdependent tasks, and (3) the goal setting effect (vertical distance between trend lines) is equal for high and low task interdependence—there is no interaction effect of goal setting and task interdependence on performance (H1). In addition, the relative importance of goal setting and task experience (i.e. the trial effect) in promoting task performance depends on task interdependence. Whereas the effect of goal setting is constant across task conditions, the learning (trial) effect is trivial for the pooled interdependent task condition, but significant and larger than the goal effect for the reciprocally interdependent task.

The results in Tables 1 and 3 support H2: performance variance is a positive function of task interdependence (T: $F=165.8$, $df=1.15$, $p<0.05$); and H3: performance variance is a negative function of goal setting (G: $F=10.60$, $df=1.15$, $p<0.05$). In addition, the results in Table 3 show both a significant trial main effect (T: $F=11.78$, $df=1.15$, $p<0.05$) and a trial by

Fig. 1. Task performance by trial, task interdependence and goal setting.
Fig. 2 illustrates the combined effect of the above significant findings, by plotting performance standard deviation across the trials for both task interdependence and goal treatments. The observations are the cell standard deviations and the lines are the linear trends over trials (learning). Note, the scale on the y-axis is reversed. The patterns in Fig. 2 are very similar to those in Fig. 1. Goal setting reduces performance variance, independent of the task. Increases in task interdependence increase performance variance. Learning reduces performance variance for the reciprocally interdependent task but has a trivial, non-significant effect on performance for the pooled interdependent task.

4. Discussion

The results show that task interdependence does not moderate the beneficial effects of goals on the level of performance. The positive effects of goals were expected for the pooled interdependent plant; and these results replicate the typical findings in the accounting literature (Baumler, 1972; Chow, 1983; Rockness, 1977). The unexpected, equally positive effects of goals for the reciprocal interdependent plant, stand in contrast with the results of a meta analysis by Wood et al. (1987) and other studies (e.g. Earley et al., 1989).

It might be claimed that different task characteristics (or, more strictly, different approaches to the operationalisation of task complexity) explain the difference in results. However, this is premature on two counts. First, prior studies have identified incomplete task knowledge (causing the development of ineffective task strategies), as a critical underlying characteristic of complex tasks that creates the conditions for goal setting to be ineffective (Baumler, 1972; Earley et al., 1989; Hirst, 1987; Wood, 1986; Wood et al., 1987). Importantly, the strong learning (trial) effects reported in the results section for the reciprocal interdependent plant, provide evidence that incomplete task knowledge was also present in this study. Second, while not the main focus of his study, Ashton’s (1990) results show, consistent with the present study, that in comparison with a control group, specific difficult goals promote performance on a complex, bond-rating task. That result is not consistent with those reported by Earley et al. (1989), yet both studies use similar approaches to operationalise task complexity.

If the differences in results are not explained by differences in how the task characteristics are operationalised, perhaps they can be explained by differences in experimental design. Does the presence of heteroscedasticity, as reported in Table 3, constitute a statistical validity threat to the test for the interaction effect described in H1? The use of repeated measures MANOVA for contrast testing controls for this threat (Boik, 1981). However, heteroscedasticity may imply a validity threat to prior studies. Yetton, Johnston and Hirst (1993) note that to compare goal effects across tasks, a statistic such as a d-statistic is used, this being the mean performance difference under goal and no goal conditions, standardised (divided) by their standard deviation (Hunter & Schmidt, 1990). In which case, task differences

### Table 3

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal setting (G)</td>
<td>1</td>
<td>25.54</td>
<td>10.60</td>
<td>0.05</td>
</tr>
<tr>
<td>Task interdependence (TI)</td>
<td>1</td>
<td>399.62</td>
<td>165.82</td>
<td>0.05</td>
</tr>
<tr>
<td>Trial (T)</td>
<td>1</td>
<td>28.39</td>
<td>11.78</td>
<td>0.05</td>
</tr>
<tr>
<td>Task interdependence by trial (TI×T)</td>
<td>1</td>
<td>23.76</td>
<td>9.65</td>
<td>0.05</td>
</tr>
<tr>
<td>Error</td>
<td>15</td>
<td>2.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For completeness, the data was inspected for evidence of an interaction effect of task interdependence×goal setting on performance variance. The data would not support such an hypothesis.
would be found to moderate the goal setting effect if performance variance (the denominator) is a positive function of task differences, as is the case here, independent of any change in performance (the numerator). Importantly, Hunter and Schmidt (1990) also show, consistent with present findings, that performance variance increases with task complexity. Accordingly, it is plausible that prior studies (e.g. Wood et al., 1987) reporting that task complexity moderates the goal setting effect can be explained by an increase in performance variance with task complexity. If so, it follows that those studies are subject to a validity threat and, as reported here, the goal setting effect is not moderated by task complexity.

Given that task interdependence is not a moderator variable, it remains to explain the unexpected positive effects of goals for the reciprocal interdependent plant. It is likely that goals combined with feedback facilitate the acquisition of task knowledge for reciprocally interdependent tasks (Campion & Lord, 1982) and, as a con-
sequence, mitigate against the conditions (i.e., incomplete task knowledge) that were expected to moderate the motivational effects of goal setting. Essentially, goals combined with feedback increase task knowledge in both tasks, but from a different base level; task knowledge is more complete for the pooled versus the reciprocal task.

While the goal setting results for the reciprocally interdependent task challenge the existing literature, the findings concerning performance variance are novel. Recall the earlier argument that the influence of task interdependence on performance variance is due, in part, to difficulties in coordinating reciprocal interdependent tasks. Importantly, the effective use of budget goals to facilitate coordination requires predictable (i.e., low variance) performance. To the extent that reciprocal interdependence creates an increase in performance variance and hence, reduces the effectiveness of budgets as a coordination device, management may need to use other means for coordination. Galbraith (1977) suggests a variety of mechanisms including allocating additional (slack) resources to cope with unpredictable events, increasing informal and formal meetings among affected groups and creating lateral relations (such as liaison roles and self-managed teams). Significantly, Van de Ven, Delbecq and Koenig (1976) report that as tasks become more unpredictable, organisations add to, rather than substitute from their repertoire of coordination modes. In the light of these findings, future research might examine the extent to which budgets are used to coordinate related tasks that involve unpredictable outcomes and what strategies organisations use to manage performance variance.

In regard to this latter matter, the present results show that establishing specific, difficult goals, rather than do-your-best goals, reduces performance variance. It follows that goal setting can, in part, create the preconditions that are necessary for using budget goals for coordination. Additionally, Locke (1982) shows that performance variance is a positive function of goal difficulty. Accordingly, firms might adjust (downwards) goal difficulty level in order to reduce performance variance so that they can use budgets for coordination. Of course, this strategy trades-off the motivational role of budget goals for the coordination role (Barrett & Fraser, 1977).

While speculative, this trade-off can be used to explain the apparent conflict between the goal setting literature, which prescribes setting specific difficult goals, and the findings by Merchant and Manzoni (1989) that profit centre managers are set specific achievable goals. On reciprocal interdependent tasks and, more generally, high complexity tasks, such as running a division, management would follow Merchant and Manzoni (1989) and set achievable goals, trading-off some potential performance gains against the benefits associated with lower budget variances or, more specifically, avoid the high costs that Merchant and Manzoni (1989) report are associated with high budget variances. In contrast, for pooled interdependent tasks and, more generally, low complexity tasks, low performance variance suggests that the conflict among budget roles is less severe. In these circumstances, management would follow the goal setting literature and Horngren, Foster and Datar (1994), and set high and challenging goals. This maximises performance without risking the costs of high budget variances. These speculations raise a future research issue concerning the trade-offs between, and management of, budget performance levels and variances.

5. Conclusion

This paper contributes to the budgeting literature in several ways. First, our results confirm the beneficial effect of budget goals in promoting performance levels. Second, these beneficial effects extend to the performance of interdependent tasks. This finding challenges the emerging view that task characteristics moderate goal effects, as well as supporting speculation that goal setting (together with performance feedback) can assist the acquisition of task knowledge. Third, we extend a literature that typically focuses on performance levels, to an examination of factors that affect performance variance. In so doing, our results suggest the need to develop a contingency/
situational perspective in explaining the use of budget goals for coordination and motivation. Moreover, where firms seek to use budgets for these purposes across a variety of situations (including those involving reciprocal interdependence), managers may need to undertake variance reduction strategies. Our results suggest two such strategies, goal setting and programs that promote task learning. Finally, recognizing the importance of both performance level and variance allows us to speculate about an important conflict in the literature. This conflict relates to alternative views about the appropriate level for setting goals, “difficult but possible” vs “highly achievable” levels.

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