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Groupcentric budget goals, budget-based incentive contracts, and additive group tasks

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# Groupcentric budget goals, budget-based incentive contracts, and additive group tasks

Groupcentric  
budget goals

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## Abstract

**Purpose** – The purpose of this paper is to examine the effects of three different types of budget goals (egocentric individual, groupcentric individual and group) on group performance of an additive task, assigned within an individual budget-based incentive contract. While previous research has established that budget-based incentive contracts motivate higher group performance than piece rate contracts for additive group tasks, no studies, which we are aware of, have considered explicitly the type of goal within this context.

**Design/methodology/approach** – We conduct a  $3 \times 2$  experiment in which we manipulate the presence of an individual goal (egocentric, groupcentric and absent) and a group goal (present and absent) on group performance of an additive task.

**Findings** – Group performance is higher for groups assigned groupcentric individual goals than for groups assigned egocentric individual goals, either alone or in combination with a group goal.

**Practical implications** – Egocentric individual goals may reinforce an individualistic orientation, which may work against the potential gains from having group members adopt more of a group focus.

**Originality/value** – This paper considers how groupcentric individual goals may improve group performance. The management accounting literature typically examines just egocentric individual goals.

**Keywords** Additive tasks, Budget-based contracts, Egocentric individual goals, Group goals, Group performance, Groupcentric individual goals

**Paper type** Research paper

## 1. Introduction

When does working in a group yield higher performance than the sum of the performance of individuals working alone and, more specifically, what role do

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management control features play in this process? Prior research in management accounting (Kelly, 2010; Libby and Thorne, 2009; Drake *et al.*, 1999) has examined this question for interdependent group tasks that are designed so that group members must share resources and information to produce group output (Wageman, 1995). The application of management control features that support mutual monitoring (Coletti *et al.*, 2005), encourage group identity (Towry, 2003) and promote information sharing (Kelly, 2010) have all been found to improve group performance when task interdependence is high. Less prevalent is research addressing appropriate incentive structures for groups when task interdependence is low. In particular, little is known about the appropriate incentives for additive tasks where group performance is measured as the sum of individual performance and where individuals produce group output without sharing resources or information (Steiner, 1972).

Bonner and Sprinkle (2002) identify that goal type and the structure of financial incentives together impact performance. For additive tasks, previous research by Guymon *et al.* (2008) and Fisher *et al.* (2003) has established that budget-based incentive contracts, that is contracts including a fixed wage plus a bonus for performance in excess of an assigned goal are better than piece rate incentive contracts at motivating group performance. However, what remains to be understood is how different goal types motivate performance on additive tasks. Thus, we take the form of contract as given and attempt to determine how different goal types within the context of a budget-based contract impact performance of an additive task.

We address two research questions regarding the effectiveness of goal type for additive tasks. The first question considers the relative effectiveness of group-based incentives and individual-based incentives for motivating group performance on an additive task. This issue is particularly interesting, given there are competing arguments in the psychology and economics literatures concerning the relative effectiveness of group and individual goals in motivating performance on group tasks. On the one hand, from the management accounting literature, Fisher (1994) uses a microeconomic argument as a basis for his (untested) proposition that individual goals will be more effective in motivating group performance than group goals when the task interdependence is low. On the other hand, from the psychology literature, Kleingeld *et al.* (2011) argue that there is an implicit (and mainly empirically unsupported) assumption that group performance can only be effectively motivated via the assignment of group goals, and Larson (2009) suggests that there are potential synergies that can be achieved through group work even for additive tasks, which is low in task interdependence[1]. For instance, working in the presence of other group members allows for social comparison and promotes feelings of social responsibility to the group, even when no communication or resource sharing between group members is allowed (Kerr and Hertel, 2011). To empirically explore these different perspectives, we examine experimentally the effectiveness of individual and group goals on performance of an additive task.

The second question considers the relative effectiveness of two different individual goal types on an additive task: egocentric and groupcentric goals. According to Crown and Rosse (1995), groupcentric individual goals are goals that are set with reference to the performance of the group. Egocentric individual goals are goals set with reference to individuals' own performance, which are typically examined in the management accounting literature and were specifically considered by Fisher (1994)[2]. Thus, we

consider the relative effectiveness of these two different types of individual goals on the performance of an additive task.

Our experimental task involves groups of three participants (55 groups in total) building simple, toy castles out of LEGO bricks[3]. We operationalize the additive task by requiring each group member to produce complete castles in the presence of, but without verbally communicating or sharing resources with, the other group members. The dependent variable is group performance, as measured by the sum of the castles produced by all group members in the final work session. The individual budget-based incentive contracts include a fixed wage plus a bonus that is a function of the difference between actual performance and the assigned goal. We manipulate the presence of an individual goal (egocentric, groupcentric and none) and a group goal (present and absent) in a fully crossed design[4].

Groups perform the task initially under a piece rate incentive contract to establish reasonable individual and group goals. In the egocentric individual condition, each group member's goal is equal to their own performance in the piece rate session. In the groupcentric individual goal condition, each group member's goal is based upon average group performance in the piece rate session (c.f., Larson, 2009)[5]. In the group goal condition, the group goal is based upon the group's total output during the piece rate session. In the mixed goal conditions, group members are assigned a combination of individual and group goals. The bonus parameters in the mixed conditions are set equal to one-half of the dollars of bonus that would be earned in the conditions where only one goal is assigned[6].

This study contributes to a growing stream of literature (Kelly, 2010; Guymon *et al.*, 2008; Coletti *et al.*, 2005; Towry, 2003) that examines how economic incentives interact with social and behavioral structures to enhance or impede group performance. Our study adds to the body of research that examines the conditions under which working in a group leads to better performance by specifically considering the effect of different goal types on performance of an additive task through the use of incentive structures. We show that for additive tasks, groupcentric incentives result in the highest performance, either alone or in combination with a group incentive. Furthermore, not all individual incentives have similar effects on performance of additive tasks, as egocentric incentives result in performance, that is lower than groupcentric performance.

The remainder of this paper is organized as follows. The next section is a literature review and hypothesis development. The third section describes the method while experimental results are presented in Section 4. The final section includes a discussion of the results, limitations and suggestions for future work in this area.

## 2. Literature review and hypothesis development

### 2.1 *The effectiveness of group and individual goals in motivating group performance*

Our first hypothesis considers the relative effectiveness of group-based and individual-based incentives for motivating group performance on an additive task. In developing our hypothesis, we consider the competing arguments in the psychology and economics literatures concerning the relative effectiveness of group and individual goals in motivating performance on group tasks. For example, a recent meta-analysis of psychology-based studies on goal setting by Kleingeld *et al.* (2011) find that specific, difficult group goals are better than easy or do-your-best group goals in motivating

group performance[7]. Kleingeld *et al.* (2011) also find that specific, difficult group goals work well for group tasks, regardless of the degree to which group members need to rely on one another for information and resources to produce good quality output.

Insights into Kleingeld *et al.*'s (2011) findings are provided by Larson (2009) and Kerr and Hertel (2011). Larson (2009) suggests that there are potential synergies that can be achieved through working in a group when task interdependence is low. Kerr and Hertel (2011) argue that working in the presence of other group members, even for a task with low interdependence, allows for social comparison and promotes feelings of social responsibility to the group, even when no communication or resource-sharing between group members is allowed. In addition, they establish perceived indispensability as a precondition for group motivation gains in group tasks[8]. Perceived indispensability is supported by the realization that one's effort affects one's own performance as well as the performance of the group (Kerr and Hertel, 2011).

While neither Larson (2009) nor Kerr and Hertel (2011) address the effectiveness of goal setting in groups, their arguments imply that an incentive structure that reinforces the perception that one is working as a member of a group and that emphasizes collective outcomes would be particularly important to realizing group synergies for additive tasks. These arguments lead us to the following hypothesis:

*H1a.* For additive tasks performed in the presence of other group members, groups assigned group goals will produce more output than groups assigned individual goals.

On the other hand, theoretical work of Fisher (1994), which is grounded in microeconomic theory, demonstrates that when the production function is additive (i.e. group output is the sum of individual output), assigning individual goals will motivate each individual to perform at his/her maximum performance capability and, therefore, maximize group output, as group output is the sum of individual output on an additive task. Although he does not empirically test his proposition, Fisher (1994) argues that if each individual is not performing to his/her maximum performance capability (i.e. some individuals are shirking), then group performance will decrease. This argument leads to the following alternative hypothesis:

*H1b.* For additive tasks performed in the presence of other group members, groups assigned individual goals will produce more output than groups assigned group goals.

## *2.2 The effect of individual goal type in motivating group performance*

Our next set of hypotheses considerS the relative effectiveness of two different individual goal types on an additive task: egocentric and groupcentric. While most prior management accounting literature, including that of Fisher (1994), defines an individual goal or target as one that directs the individual's attention to maximizing their own output relative to the goal, in the management literature, Crown and Rosse (1995) argue that individual goals assigned to groups can be of two types: egocentric and groupcentric. Each goal type is distinguished by the degree to which it encourages a group performance orientation[9]. Performance orientation is defined as the degree to which the goal directs an individual's attention to exerting effort toward maximizing individual performance or the performance of the group. Egocentric individual goals encourage individuals to focus attention on maximizing their own individual

performance, regardless of the performance of the group. Egocentric individual goals are the type examined by Fisher (1994) and long studied in the accounting literature. By comparison, groupcentric individual goals encourage individuals to focus on the degree to which their individual performance affects group output. According to Crown (2007), groupcentric goals send the message, “you are acting as a member of a group” to individuals; therefore, they are a better fit for additive tasks than egocentric goals as they require individuals to consider how their performance contributes to the performance of the group, thus supporting the development of group synergies as described by Larson (2009) and Kerr and Hertel (2011).

Utilizing microeconomic theory, Fisher (1994) demonstrates the effectiveness of egocentric (but not groupcentric) individual goals for additive tasks while Crown and Rosse (1995) use goal setting theory to develop hypotheses and present empirical results indicating that groupcentric individual goals are more effective than egocentric individual goals in motivating performance of a highly interdependent group task. Below, we draw on elements of each of these lines of inquiry to develop competing hypotheses concerning the relative effectiveness of egocentric and groupcentric individual goals in motivating group performance of an additive group task.

### 2.3 Egocentric individual goals

Fisher (1994) argues that group performance of an additive task will be maximized when all individuals are working at their peak capacity. Thus, an egocentric assigned goal that is based on an individual's own previously demonstrated performance will motivate all individuals at all capabilities to maximize their own individual performance.

A groupcentric goal for an additive task must be set with reference to the performance of the group to activate a group performance orientation in group members (Crown and Rosse, 1995). Thus, it is likely to be set based with some regard to the average or standard level of performance of the group. If this is the case, goal-setting theory suggests that groupcentric goals may not motivate all individuals equally (Locke and Latham, 1990). For example, above-average individuals may easily obtain the average goal without excessive effort, and below-average individuals may not perform at their “peak performance” if the goal is “unattainable”. Thus, groupcentric goals may allow some individuals to “shirk” or “loaf”. On the other hand, because egocentric goals are based upon each individual's demonstrated performance, there is no shirking by either high or low performers. Accordingly, we posit that performance will be maximized when egocentric individual budget targets are assigned that are tailored to the performance of each member of the group. This gives rise to *H2a*:

*H2a.* For additive tasks performed in the presence of other group members, groups assigned egocentric individual goals will produce more than groups assigned groupcentric individual goals.

### 2.4 Groupcentric individual goals

According to Crown and Rosse (1995), egocentric and groupcentric individual goals have different effects on the group member's performance orientation, that is the degree to which they focus cognitively on maximizing group or individual performance. Egocentric individual goals encourage individuals to focus attention on maximizing their own individual performance, regardless of the performance of the group, while

groupcentric individual goals encourage individuals to focus on the degree to which their individual performance affects group output. According to [Crown \(2007\)](#), groupcentric goals send the message “you are acting as a member of a group” to individuals; therefore, they are a better fit for additive tasks than egocentric goals, as they require individuals to consider how their performance contributes to the performance of the group[10].

[Kerr and Hertel \(2011\)](#) argue that working in the presence of other group members, even for a task with low interdependence, allows for social comparison and promotes feelings of social responsibility to the group, even when no communication or resource-sharing between group members is allowed. In addition, they establish perceived indispensability as a precondition for group motivation gains in group tasks[11]. Perceived indispensability is supported by the realization that one’s effort affects one’s own performance as well as the performance of the group ([Kerr and Hertel, 2011](#)).

Based on these arguments, we expect that for additive tasks, a groupcentric individual goal will be more likely to increase individuals’ perception that their effort affects the group’s performance (i.e. level of perceived indispensability to the group is higher) than an egocentric individual goal that focuses attention solely on maximizing one’s own performance. This discussion gives rise to the following hypothesis, which is in direct competition with *H2a* above:

*H2b.* For additive tasks performed in the presence of other group members, groups assigned groupcentric individual goals will produce more than groups with egocentric individual goals.

### 3. Method

#### 3.1 Participants

In total, 165 undergraduate business students from a mid-sized university took part in the experiment in 55 groups (group size is 3). Participants volunteered in groups of three, and each group was randomly assigned to experimental condition. Detailed demographics are presented in [Table I](#) In total, 53 per cent of participants were female, and 92.7 per cent were enrolled in at least the third year of the four-year undergraduate

Factor	Frequency	(%)
<i>Gender</i>		
Male	77	46.7
Female	88	53.3
<i>Year in University</i>		
1st	0	0.0
2nd	12	7.3
3rd	115	69.7
4th	32	19.4
<i>Other</i>	6	3.6
<i>Area of study</i>		
Business	164	99.4
Other	1	0.6

**Table I.**  
Participant  
demographics  
(*n* = 165)

business program. Participants were recruited through visits by one of the authors to all third- and fourth-year required business classes. The experiment took place outside of class hours over a one-week period.

### 3.2 Experimental design

In this study, we used a  $3 \times 2$  between-subjects experimental design. We manipulated the presence of an individual goal (egocentric, groupcentric and absent) and a group goal (present and absent) assigned within a budget-based incentive contract. Given no prior studies, which we are aware of, have examined the relative effectiveness of incentive contracts that include groupcentric individual goals on group performance, we chose a fully crossed design, as it allows us to compare group performance in the presence and absence of individual, group, mixed individual and group, and no budget goals.

As in Fisher *et al.* (2003), we simulate an additive (and structurally independent) group task. In our task, participants individually produce complete simple toy castles out of Lego bricks. Castles are constructed using two large blue Lego bricks for the base. Two large white bricks are added to the base at right angles followed by four medium red and four medium yellow bricks. Four small white bricks are then placed at right angles to form turrets. Castles are considered good quality if they are constructed with the bricks of the correct color and size placed in the correct position, and if the castle does not fall apart when handled. To adhere to the definition of an additive task, no verbal interaction was allowed between individual group members in the learning or production sessions, although unlike the study by Fisher *et al.* (2003), the work was performed in the presence of other members of the group. The dependent variable was group performance, measured as the number of complete castles of good quality produced by the group in the work session.

### 3.3 Procedures

Participants entered the room as a group of three and were assigned to a large table on which three work stations were set up. Each participant sat down at their designated work station where they found boxes of Lego blocks sorted by color and size and an empty box designated for finished goods. In addition, a sample castle was placed at each work station as a benchmark for a castle of good quality. The experimenter first asked the participants to read a description of their role within the experiment (see the [Appendix](#)). Participants were informed that they were to act as new employees of the Castle Division of Toyco Corporation. Their job was to build, from start to finish, Lego castles of good quality. The experiment consisted of three main parts described in turn below: learning session, piece rate session and work session.

**3.3.1 Learning session.** During the learning session, participants learned to build the toy castles using the model at their work station as an example. In addition, they were given the opportunity to clarify the task with the experimenter. The learning session was 5 minutes in length[12].

**3.3.2 Piece rate session.** In the piece rate session, participants were informed that their objective was to produce as many castles of good quality as possible during the session, which also lasted 5 minutes. Each participant earned a piece rate of \$0.25 for each fully completed good quality castle he/she produced. At the end of this session, the experimenter and each participant agreed on the number of good quality castles produced, and the experimenter recorded the output. The output produced in the piece



rate session was our proxy for performance capability as defined by Fisher (1994) and, therefore, was used to set the budget goals for the work session.

*3.3.3 Work session.* In the work session, the budget-based incentive contract and budget goals were introduced. In the condition where no budget goals were assigned, participants were informed that they would receive a fixed wage of \$6 each. In conditions where an individual egocentric, an individual groupcentric or a group goal was assigned, participants were informed that they would be paid a fixed wage of \$3 plus a bonus depending on their performance relative to the assigned goal(s). Their incentive contract was of one of the following forms depending on experimental condition:

$$P = \$3 + \$1(x_i - t_i) \quad \text{or} \quad P = \$3 + \$1(x_g - t_g) \quad \text{or}$$

$$P = \$3 + [\$0.50(x_i - t_i) + \$0.50(x_g - t_g)]$$

where  $p$  = total payment,  $x_i$  = actual individual output,  $x_g$  = actual group output,  $t_i$  = individual (ego- or groupcentric) budget goal and  $t_g$  = group budget goal[13]. If actual output is less than the assigned goal, the participant receives only the \$3 fixed wage. Participants were informed individually and in writing of the budget-based incentive contract and budget goal(s) assigned to them.

To test participants' understanding of the incentive contract, they were required to calculate hypothetical earnings under several different levels of actual performance and budget goals. Participants were allowed to ask for clarification and received explanations from the experimenter for incorrect answers before beginning to work. Participants worked on building castles for 5 minutes and then recorded their actual individual output and the group's total output on a summary sheet. The experimenter inspected the participants' work and collected the summary sheets. While the experimenter calculated payments to be made, participants completed a post-experimental questionnaire that included manipulation check and demographic questions. Once the questionnaire was completed, participants received their earnings from both production rounds. Participants earned an average of \$8.00 for approximately 30 minutes of work (\$2.25 in the piece rate production round plus \$5.75 in the final production round)[14].

### 3.4 Experimental manipulations

*3.4.1 Egocentric individual goal.* Group members in the *egocentric* individual goal condition were assigned a goal for the work session equal to the number of good quality castles which they personally produced in the piece rate session, i.e. equal to their performance capability as suggested by Fisher (1994), and were informed of this fact. For example, if group members produced six, seven and eight castles, respectively, in the piece rate session, each group member would be assigned six, seven and eight castles, respectively, as their individual goal for the work session.

*3.4.2 Groupcentric individual goal.* Group members in the *groupcentric* individual goal condition were assigned an individual goal equal to the *average* number of castles of good quality produced by each member of their *group* in the piece rate session. For example, if group members each produced six, seven and eight castles, respectively, in the piece rate session, each group member would be assigned seven castles (i.e.  $[6 + 7 + 8]/3$ ) as their individual goal for the work session, and they were

informed that this number represented their group's average individual performance in the piece rate session.

**3.4.3 Group goal.** Group members in the *group* goal condition were assigned a group goal in the work session based upon their group's total output in the piece rate session and were informed of this fact. For example, if group members produced six, seven and eight castles, respectively, in the piece rate session, the group would be assigned a goal of 21 castles (i.e.  $6 + 7 + 8$ ) in the work session.

**3.4.4 Mixed group and individual goals.** In the two conditions where the incentive contract included *both group and individual* goals, the goals were assigned as described for each type of individual and the group goal above, and the participants were informed of the method of goal assignment. For example, if group members produced six, seven and eight castles, respectively, in the piece rate session (with an average of seven), each group member in the *egocentric plus group goal* condition would be assigned an individual goal of six, seven and eight castles, respectively, and the group would be assigned a group goal of 21 castles in the work session. In the *groupcentric individual plus group goal* condition, each group member would be assigned an individual goal of seven castles (the average number produced in the piece rate session), and the group would be assigned a group goal of 21 castles for the work session.

## 4. Results

### 4.1 Manipulation checks and potential covariates

To test the effectiveness of our manipulation of individual and group goals, we asked participants to identify the presence or absence of an individual and/or group goal on the questionnaire. Of the 165 participants, 161 answered the question correctly. None of the four who answered incorrectly were in the same work group, although three of them were assigned to the groupcentric individual goal condition. These three indicated the presence of both a group and individual goal on the questionnaire. The fourth participant was assigned to the egocentric individual goal condition, but indicated the presence of both a group and individual goal. Given that the results are qualitatively similar whether these four groups are retained or removed, we retain all 55 groups in our sample.

In the egocentric goal condition, different group members were assigned different goals and were aware of this fact. In the groupcentric condition, some group members may have perceived the "average" goal assigned as more difficult/easy than others depending on their own performance during the piece rate session. Therefore, in each case, fairness perceptions may play a role. To rule out this alternative explanation, we compared mean ratings (scale of 1 = strongly disagree through 5 = strongly agree) on the following question (with wording appropriate to the experimental condition as noted) included in the post-experimental questionnaire: "The individual (group) production target assigned to me (my group) was fair". We find no significant differences in fairness perceptions depending on experimental condition. Therefore, we do not believe that differential perceptions of fairness between conditions are contributing to differences in group performance between experimental conditions.

To check whether differences in skill sets among individuals within groups may have significantly influenced the results, we performed a 3 (egocentric, groupcentric and absent)  $\times$  2 (group goal: present and absent) ANOVA in which the absolute maximum difference among group members' output during the piece rate session was the

dependent variable. Results indicate no significant differences in means across the goal conditions[15]. We also performed a 3 (egocentric, groupcentric and absent) × 2 (group goal: present and absent) ANCOVA in which the group performance was the dependent variable with skill (based on piece rate output) as a covariate and compare it to the findings of an ANOVA without skill as the covariate. Results indicate no significant differences in means across the conditions. Therefore, it is reasonable to believe that group members' differences in skill within groups did not significantly influence the overall results.

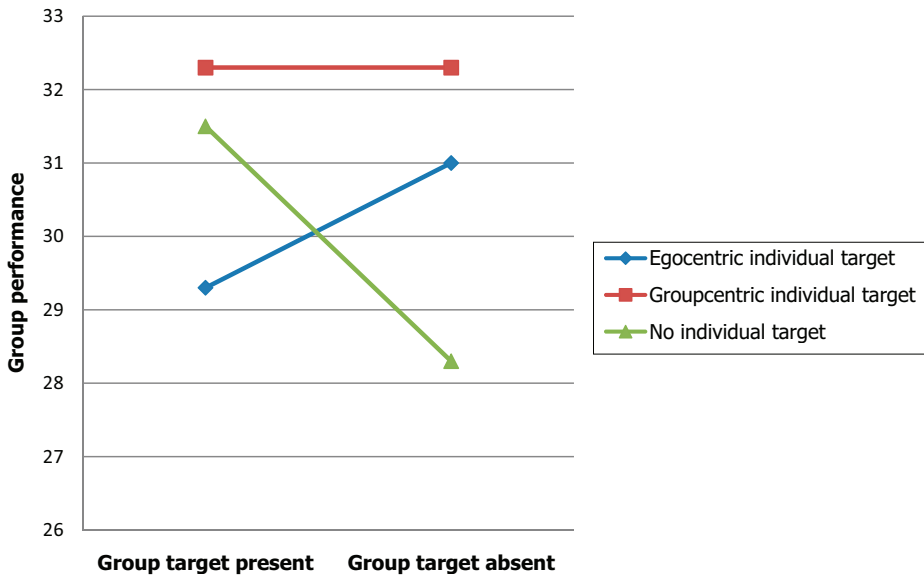
4.2 Descriptive statistics

Descriptive statistics are presented in Table II and Figure 1. Overall, our findings indicate that groupcentric individual goals result in the highest group performance, and

Group goal	Individual goal			Total
	Egocentric	Groupcentric	None	
Present	29.30 (2.31) <i>n</i> = 10 Cell 1	32.30 (2.50) <i>n</i> = 10 Cell 2	31.50 (2.80) <i>n</i> = 10 Cell 3	31.03 (2.77) <i>n</i> = 30
	Absent	31.00 (2.91) <i>n</i> = 10 Cell 4	32.33 (3.32) <i>n</i> = 9 Cell 5	
Total		30.15 (2.70) <i>n</i> = 20	32.31 (2.83) <i>n</i> = 19	30.31 (2.91) <i>n</i> = 16

**Table II.** Mean (SD) of group performance by experimental condition<sup>a</sup>

**Note:** <sup>a</sup>Mean (SD) of group performance is measured, as the number of castles of good quality produced by the group where the group size is three



**Figure 1.** Mean group performance by experimental condition (*n* = 55)

that mixed egocentric and group goals result in the lowest group performance on additive tasks. The mean number of castles produced by all groups was 30.94 (SD = 2.93) in the work session. The groups assigned only groupcentric individual goals produced the most castles (mean = 32.33, SD = 2.50), while the groups assigned no goals (i.e. a fixed wage) produced the least castles (mean = 28.33, SD = 1.97).

#### 4.3 Hypothesis tests

Consistent with prior research (Kadous *et al.*, 2003; Hirst *et al.*, 2007), we use contrast coding analysis, following the approach recommended by Buckless and Ravenscroft (1990) to test our hypotheses. Contrast coding is a particularly appropriate analysis because our hypotheses consist of two sets of competing hypotheses, and contrast coding will enable us to assess which, if any, of the competing hypotheses are consistent with the pattern found in our results.

*H1a* and *H1b* are competing hypotheses regarding the preeminence of individual goals versus group goals. *H1a* predicts that performance on an additive task will be higher with group goals than individual goals, which is in direct competition to *H1b*, that performance on an additive task will be higher with individual goals than group goals. To test *H1a*, we derive contrast weights of +1 for the mixed group and individual goal conditions (Cells 1 and 2), and +2 for the pure group goal condition (Cell 3). These weights reflect our expectation that performance under the “pure” group goal condition will be higher than performance under the mixed conditions which contain individual and group goals. We also derive contrast weights of -2 for the two pure “individual” conditions (e.g. pure egocentric and pure groupcentric) (Cells 4 and 5). The condition with no goal or incentive is assigned a weight of 0. Support for *H1a* would be a significant and positive planned contrast value in Table III, Panel A. To test *H1b*, we reverse the sign on the contrast weights; therefore, support for *H1b* would be a significant and positive planned contrast value in Table III, Panel B.

As shown in Table III, Panels A and B, both contrast tests yield the same *F*-value. However, the planned contrast was not significant ( $F = 0.41$ ,  $p = 0.53$ ) [16]. Consequently, neither *H1a* nor *H1b* are supported, and our analysis of *H1a* and *H1b*

##### Panel A

Test of *H1a*: Individual is greater than group

Planned contrast using group performance as the dependent variable and +1, +1, +2, -2, -2, 0, weightings for cells 1, 2, 3, 4, 5 and 6, respectively

Sources of variation	SS	Df	MS	<i>F</i> -value	<i>p</i> -value
Model contrast	2.96	1	2.96	0.41	0.53
Contrast value: -2.07					

##### Panel B

Test of *H1b*: Group is greater than individual

Planned contrast using group performance as the dependent variable and -1, -1, -2, +2, +2, 0 weightings for cells 1, 2, 3, 4, 5 and 6, respectively

Sources of variation	SS	Df	MS	<i>F</i> -value	<i>p</i> -value
Model contrast	2.96	1	2.96	0.41	0.53
Contrast value: 2.07					

**Table III.**  
Planned contrast  
results for *H1*

RAF 14,2 indicates that neither individual nor group goals consistently result in higher group performance on an additive task.

200 Similarly, *H2a* and *H2b* are competing hypothesis regarding the efficacy of two different types of individual goals, egocentric versus groupcentric. *H2a* predicts that performance on an additive task will be higher with egocentric individual goals than groupcentric individual goals. Conversely, *H2b* predicts that performance on an additive task will be higher with groupcentric individual goals than egocentric individual goals. We test *H2a* by assigning contrast weights of +1 to the egocentric conditions (Cells 1 and 4), contrast weights of -1 to the groupcentric conditions (Cells 2 and 5), and contrast weights of 0 to the no individual goal conditions. These weights reflect our expectation that performance under the “egocentric” goal conditions will be higher than performance under the “groupcentric” conditions. Support for *H2a* would be a significant and positive planned contrast value in Table IV, Panel A. To test *H2b*, we reverse the contrast weights to reflect the expectation that performance on an additive task under the “groupcentric” goal condition will be higher than performance under the “egocentric” conditions. Support for *H2b* would be a significant and positive planned contrast value in Table IV, Panel B.

As shown in Table IV, Panels A and B, both contrast tests yield the same *F*-value, and the planned contrast is significant ( $F = 6.25, p = 0.02$ ). To determine which of *H2a* and *H2b* is supported, we examined the sign of the contrast value. A positive contrast value indicates that the contrast is in the hypothesized direction. As per Table IV, Panel A, the contrast value for the weights assigned to *H2a* is -4.33, whereas per Table IV, Panel B, the contrast value for the weights assigned to *H2b* is 4.33. Accordingly, *H2b* is supported, but *H2a* is not supported. These results suggest that performance on an additive task is significantly higher with groupcentric individual goals rather than egocentric individual goals.

#### 4.4 Supplementary analysis

We did a supplementary contrast test to determine if groupcentric goals dominated all other incentive structures. Thus, we tested whether performance in both “pure”

##### Panel A

Test of *H2a*: Egocentric is greater than groupcentric

Planned contrast using group performance as the dependent variable and +1, -1, 0, +1, -1, 0 weightings for cells 1, 2, 3, 4, 5 and 6, respectively

Sources of variation	SS	Df	MS	<i>F</i> -value	<i>p</i> -value
Model contrast	45.68	1	45.68	6.25	0.01
Contrast value: -4.33					

##### Panel B

Test of *H2b*: Groupcentric is greater than egocentric

Planned contrast using group performance as the dependent variable and -1, +1, 0, -1, +1, 0 weightings for cells 1, 2, 3, 4, 5 and 6, respectively

Sources of variation	SS	Df	MS	<i>F</i> -value	<i>p</i> -value
Model contrast	45.68	1	45.68	6.25	0.01
Contrast value: 4.33					

**Table IV.** Planned contrast results for *H2*

groupcentric and “mixed” groupcentric conditions was greater than all other conditions. Using contrast weights of +2 for both groupcentric conditions and weights of -1 for the remaining four conditions, we find this contrast is also significant ( $F = 8.71, p = 0.01$ ). This result suggests that groupcentric individual goals, alone or in combination with group goals, motivated significantly greater performance than all other conditions. A graph of our results in Figure 1 supports this finding.

To allay possible concerns regarding the power of our tests, given our sample size of 55 groups, we conducted a power analysis, following the approach of *Faul et al. (2007)*. The power calculation considers the number of groups, as well as the overall sample size. We performed an ANOVA using group performance as the dependent variable and individual goal and group goal as independent variables. We found a significant main effect of individual goal ( $F = 4.35, p = 0.02$ ) and a significant individual goal  $\times$  group goal interaction ( $F = 3.51, p = 0.04$ ). Results are that our significant main effect has an effect size of 0.342 and power of 0.979, and our significant interaction effect has an effect size of 0.356 and power of 0.986, all of which are greater than the threshold for a “large” effect size set by *Cohen (1988)* of 0.80. Consequently, our sample has sufficient power.

## 5. Discussion

In this study, we examine the effects of budget-based incentive contracts that include individual and group budget goals on group performance of an additive task, that is a structurally independent group task that is completed with little to no interaction between group members. *Fisher (1994)* provides a basic economic prediction indicating that group members should be assigned individual goals tailored to the performance capability of each group member (i.e. egocentric individual goals). Our concern is that egocentric individual goals may only serve to reinforce an individualistic orientation, which may work against the potential gains from group motivation, considered an important benefit of organizing structurally independent work groups (*Kerr and Hertel, 2011*). Therefore, we consider whether groupcentric individual goals (*Crown and Rosse, 1995*) direct group members to adopt more of a group than an individual focus, which might result in higher group performance than egocentric individual goals typically examined in the management accounting literature.

Results indicate that group goals on their own did not result in significantly higher performance on an additive task than individual goals, nor did we find the reverse. Instead, we found that a particular type of individual goal, the groupcentric goal, either alone or combined with group goals, resulted in higher performance on additive tasks than egocentric goals. In addition, we also found that groupcentric individual goals, alone or in combination with group goals, motivated significantly greater performance than all other conditions.

Certain features of our study limit its generalizability. First, generalization is limited to groups of a similar size performing a similar task performed in the presence of other group members. An important benefit of assigning both group and individual goals is to limit potential free-riding in groups (*Locke and Latham, 1990*). Our study was limited to groups of three, and group members could fully observe each other while performing the experimental task, thereby limiting opportunities for free-riding; therefore, this may be one explanation for our failure to support our hypothesis that group performance would be higher for individual goals than group goals. Future research is required using larger groups and less transparent tasks to further examine the effect of mixed group and

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individual goals on group performance of additive tasks and in settings where group members perform the task in isolation from one another.

Second, we used a very specific operationalization of a groupcentric individual goal, that is the average individual performance group members in the prior period. While this operationalization of a groupcentric goal adheres to the formal definition provided by [Crown and Rosse \(1995\)](#), we recognize that our results may not generalize to settings with alternative operationalizations of a groupcentric goal. Given our objective was to provide initial evidence on the potential effectiveness of groupcentric goals to motivate group performance of an additive task, we leave tests of the effect of alternative operationalizations of groupcentric individual goals to future research.

Finally, while 165 participants were involved in our study, they were divided into 55 groups of three spread across six experimental conditions. Consequently, the power of our tests is necessarily limited by the fact that our maximum cell size was ten groups. While experiments conducted at the group level of analysis tend to suffer from this limitation, future research replicating our findings would bolster confidence in the generalizability of our results beyond the current study.

Despite these limitations, this study contributes to the literature in the following ways. First, we introduce the concept of a groupcentric individual goal ([Crown and Rosse, 1995](#)) to the accounting literature and test its effectiveness in motivating group performance on an additive group task. We are able to show that groupcentric individual goals result in the highest performance on additive tasks, either alone or combined with a group goal.

Second, [Fisher \(1994\)](#) argues that egocentric individual goals assigned within the context of individual budget-based contracts will motivate the highest group performance on additive tasks. However, results in the management literature suggest that there may be additional benefits and costs associated with using individual goals to motivate group performance. We compare, in the context of an additive group task, the performance effects of traditional egocentric individual goals that focus a group member's effort on maximizing his/her own individual output versus groupcentric individual goals that focus a group member's effort on maximizing output of the group ([Crown and Rosse, 1995](#)). Thus, we show that not all individual-based goals have similar effects on performance of additive tasks. Our findings add to a growing stream of literature that examines how economic incentives interact with social and behavioral structures to enhance or impede group performance.

Finally, we add to the recent research on the effectiveness of mixed individual and group goals in motivating group performance. Although combining group and individual goals has been found to send mixed messages leading to reduced group performance ([Libby and Thorne, 2009](#)), results of our study indicate that group goals make no apparent difference to group performance when combined with a groupcentric individual goal, but may be detrimental when combined with an egocentric individual goal. Thus, our findings suggest that there is no potential benefit associated with assigning mixed goals for additive group tasks.

## Notes

1. While there is a long history of studying group process losses beginning with [Steiner \(1972\)](#), consideration of potential process gains from conditions that support group motivation is relatively new ([Kerr and Hertel, 2011](#)).

2. The directive role of goals on effort was originally established by goal theory (Locke and Latham, 1990). Goals direct individual effort toward goal-relevant and away from goal-irrelevant activities (Locke and Latham, 2002).
3. We follow Fisher *et al.* (2003) by utilizing a simple production task that is easy to learn, and for which, units of output can be cleanly measured after controlling for individual skill at the task.
4. We also include a mixed goal condition in our experimental design to provide comprehensive insight into the relative effectiveness of goal types on additive tasks, which requires us to utilize a fully crossed experimental design.
5. Average individual performance of the group in a prior period is only one of several ways one could operationalize the theoretical groupcentric individual goal construct. An assumption implicit in our work is that any individual goal that is set with reference to prior group performance will result in group performance that is on average higher than group performance under egocentric individual goals. We leave tests of the effect of alternative operationalizations of groupcentric individual goals on group performance of an additive task to future research. To the degree this assumption does not hold, the results of this study will fail to generalize, and we recognize this limitation in the last section of the paper.
6. For example, in the group goal condition, the bonus parameter is set at \$1 per castle produced in excess of the group goal. In the group plus egocentric (groupcentric) individual goal condition, the bonus parameter is divided in half so that participants earn 50 cents for each castle the group produces in excess of the group goal and 50 cents per castle that the individual produces in excess of the egocentric or groupcentric individual goal. Therefore, groups in this condition have no economic incentive to focus on either the group or individual aspect of the task.
7. We note that our study contributes to that of Kleingeld *et al.* (2011), given they do not consider studies that include incentives for good performance, nor do they compare the effects of assigning group goals to no goals on group performance.
8. A second precondition is the ability to make social comparisons (Kerr and Hertel, 2011). In the current study, we hold the opportunity for social comparison constantly high (i.e. all group members perform the task in the presence of other group members).
9. In fact, in their meta-analysis, Kleingeld *et al.* (2011) recognize that the only prior work in the goal-setting literature that has examined the effect of individual goals on group performance is that of Crown and Rosse (1995).
10. Although the groups in Crown and Rosse (1995) were assigned goals, they were not financially compensated for their performance. Given Crown and Rosse (1995) found effects without financial incentives, we suspect that this effect will be enhanced in settings where goal achievement and financial incentives are linked. On the other hand, Crown and Rosse (1995) examined performance effects of groupcentric goals assigned for an interdependent team task, where both verbal and physical interaction between group members was required to produce output. Our setting works against finding such effects given interaction between group members is limited to working in the presence of other group members on a non-interdependent task.
11. A second precondition is the ability to make social comparisons (Kerr and Hertel, 2011). In the current study, we hold the opportunity for social comparison constantly high (i.e., all group members perform the task in the presence of other group members).



12. The task was easily and quickly learned in the initial 5 minutes, and the piece rate in the second session motivated maximum effort. These factors should reduce any differences due to learning. Furthermore, participants were drawn from a relatively homogenous population of undergraduate business students, which may also mitigate significant differences between groups due to differences in rates of learning the task.
13. The bonus parameter of \$1 per castle was set based on the performance of a similar group of participants who took part in a pre-test of the experiment to ensure that the expected value of the bonus was approximately equal to the \$3 extra (\$6 total) paid to the participants in the fixed wage (no goal) condition. For groups assigned both an individual and a group goal, the bonus parameter was split in half, paying 50 cents for each castle of good quality produced in excess of the group goal and 50 cents for each castle produced in excess of the individual goal.
14. Mean pay in the work session differed somewhat between experimental conditions with the highest average pay earned in the group goal condition (\$7.50) and the lowest average pay earned in the egocentric individual goal condition (\$4.37). Participants in the fixed wage condition received the expected value of \$6 regardless of performance.
15. Results did not significantly change when the standard deviation in mean performance was used as the dependent variable.
16. As a robustness check, we used weights of +2, +2, +2, -3, -3 and 0 for *H1a* and their inverse for *H1b*. This contrast is also not significant ( $F = 0.64, p = 0.43$ ).

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### Appendix. Case scenario

Castle division is the newest division of the TOYCO Corporation. It produces a new product line of toy castles. The toy castles are part of a set of toys, including toy bridges, knights and dragons, with a medieval theme. These other toys are made in different divisions of the company. Production of the castles has to be carefully planned so that the total number of castles will match the total number of other toys (one castle per set). Consequently, management must establish goal levels of production of castles to ensure that expected demand during the busy Christmas season can be met. Castle division has selected you to be a production trainee. Your job is to work with your teammates to make castles. Remember that each castle your team makes must be of the highest quality.

On the table in front of you, you will find a sample of a complete castle and a box of castle pieces. Your job is to build good quality castles like the one in front of you during the following production rounds. A good quality castle is one that includes pieces of the same size, as the sample

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castle and the pieces must be in the correct places. The castle must not fall apart when handled. Pick up the castle in front of you now and familiarize yourself with it. Notice that there are small, medium and large blocks used in its construction. The first two layers contain large blocks. The third layer is made up of medium blocks, and the top layers are made of small blocks. You will have the next 5 minutes to learn how to build good quality castles using the pieces in front of you. Feel free to ask questions to ensure that your castles are properly constructed. I will check the quality of your castles, as you work on them.

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