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## **Theorising the Impact of Incentive Types on Organisational Performance in Anglo Cultures: A Reply to Drake, Haka and Ravenscroft (1999)**

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### **ABSTRACT**

Experimental research suffers from biases introduced by experiment design choices, such as the choice of alternative incentive and reward structures. We propose that framing rewards in a broader typology when researchers make decision about which reward structures to use in an experiment will minimise the potential for a false choice bias. To highlight this problem we replicate Drake, Haka and Ravenscroft's (1999) incentive structure experiment using a simpler, more theory driven design. Drake et al (1999) propose that organisational performance maybe be better if group compensation is given in preference to individualistic compensation, within the context of an information rich environment (using activity based costing). In particular, Drake et al (1999) apply an experimental research design to test that proposition using U.S. MBA students. Their results suggest that, *ceteris paribus*, given a group in preference to an individualistic incentive scheme, innovation, efficiency and profitability may improve. We argue that this conclusion is inconsistent with the incentive structure choices faced by managers, the societal values of the U.S., culture and agency theories in general. A possible explanation for Drake et al's (1999) result is the use of a tournament incentive scheme as the basis for individual compensation. As such, we replicate the Drake et al (1999) experiment using Australian university students and an individual profit incentive scheme as the basis for individual compensation. Our results, in contrast to Drake et al. (1999), indicate that given an individual in preference to group incentive scheme, task performance improves in an information rich environment. This experiment highlights the false choice bias that reduces the generalizability of experimental research in general and highlights the value of propositions couched in a broader reward typology.

*Key words:* Experiment research methods; Incentives; National Culture; Agency Theory; Group and Individual Compensation

*Jel classification:*

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## **Introduction**

Research into rewards and incentives has a long and often conflicting history, often between the development of analytical theories (Coase, 1937; Jensen and Meckling, 1976; Alchian and Demsetz, 1972; Holmstrom, 1979) and empirical research at various levels of the organization (Welbourne and Gomez Mejia, 1995; Murphy, 1999; Prendergast, 1999). The variation in practice between incentive scheme types, task structure, risk profile, the information environment and the sheer volume of incentive based research makes drawing practical generalizations from the incentive literature problematic. Further, the lack of well established typologies increases the difficulty in developing a consistent theory of incentives. This study investigates how the lack of a well developed typology increases the potential for bias in experiment based research which attempts to study the impact of different incentives types on organisations. Specifically, we investigate how the use of a compensation choice typology reduces the potential for a false choice fallacy in experimental research design.

Conducting experiments using human subjects requires substantial resources, requiring tradeoffs to be made between the allocation of scarce resources and the benefits of the experiment. For example, an important trade off is the choice of independent variable groups for the basis of comparison. By choosing independent variables that do not reflect the underlying population, the generalizability of a piece of research is reduced by a limited selection bias. In this way, scarce resources increase the potential of a false choice fallacy in the experiment design. In order for a false choice, limited independent variables are offered as alternatives, when in fact there are 'better' alternatives that are not included (Dowden, 2008), introducing bias into the results. We propose that by positioning a piece of research within a broader typology, the potential for a false choice fallacy is reduced. We replicate part of Drake, Haka and Ravenscroft's (1999) incentives and activity based costing (ABC) experiment to illustrate how using a broader typology in the selection of independent variables can lead to radically different findings.

The Drake et al (1999; 2001) is chosen to replicate for two reasons. First, it is an example of exemplary research published in a top tier accounting journal with an established and replicable methodology. Second, other studies that consider the type of incentive compensation used by Drake et al (1999; 2001) suggest a 'better' independent variable as a dichotomous contrast. Drake et al (1999; 2001) argue that, *ceteris paribus*, workers in the

United States perform better, and in that context improve organisational performance if given a group compensation scheme in comparison to workers given a tournament compensation scheme, in an information rich environment. They characterize tournament schemes as a specific type of an individual compensation scheme with ‘individually oriented incentives’ (Drake et al, 1999, p 325). Further, in their theory development they draw from Wruck and Jensen’s (1994, p 279) proposition that individual piece rate schemes which encourage individualistic actions “. . . destroy value by discouraging cooperation and teamwork” (Drake et al, 1999, p 326). By comparing compensation schemes that have an individualistic versus a group focus, they provide evidence that group compensation is more efficient in an ABC setting relative to individualistic compensation.

This study is motivated by an apparent gap in the literature as to which type of compensation scheme is efficient in an information rich environment. On the one hand, Drake *et al* (1999) suggest that group compensation is efficient. On the other hand, some researchers suggest that individual compensation is more efficient (Brown, Matolcsy and Wells, 2008).<sup>1</sup> Although, it is difficult to disagree with Drake et al’s (1999) propositions, Wruck and Jensen (1994) note that there are a number of contingent factors that require address that require address before assuming that individualistic compensation which encourages competition is an inefficient contracting choice. Potential contingent factors to consider when theorising whether individual compensation is efficient are task structure and participant cultural values. For example, in the context of agency theory, Brown, Matolcsy and Wells (2008) argue that individual compensation is more efficient than group compensation in information rich environments as individual effort is tightly linked to rewards (Holmstrom, 1979). On the other hand, group compensation is more efficient than individual compensation where participant tasks are interdependent and there are gains from co-operation such as integrated firms (Brown *et al* (2008). Arguably, the information environment and task structure are relevant independent variables when considering the relative efficiency of group compensation.

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<sup>1</sup> A tighter link between pay and performance can lead to increased effort (Holmstrom, 1979). If the benefits of increased effort outweigh the costs of individualistic actions, then individual compensation may be an efficient contracting choice (Brown, Matolcsy and Wells, 2008).

Culture theories also suggest that, *ceteris paribus*, in the United States and in other Anglo<sup>2</sup> countries, individual compensation will produce better organisational performance in some circumstances (Hofstede, 1993; Che and Yoo, 2001; Chiang and Birch, 2005). The countries within the Anglo cluster are relatively Individualist, low on Power Distance, Masculine and low on Uncertainty Avoidance. According to Hofstede (1993 p. 65) managers in countries that are high on individualism should link incentives (or bonuses) to an individual's performance.<sup>3</sup> Additionally, Chiang and Birtch (2006), suggest that workers in countries with an internal locus of control (Individualist and low on Power Distance), are more Masculine and have a high tolerance for uncertainty will perform better given an individual compensation scheme because of a greater fit between cultural values and incentive scheme attributes. Further, incentives research emanating from the Anglo grouping of countries is dominated by theories that are closely related to agency theory, which implicitly posits that individual incentives are the cornerstone in designing an efficient compensation scheme (Murphy, 1999; Prendergast, 1999; Che and Yoo, 2001; Brown et al, 2008).<sup>4</sup> This view is consistent with the cultural values of the above mentioned countries. Therefore, national culture may be a relevant contingent factor when considering the relative efficiency of group versus individual compensation.

We argue that the dramatic contrast between Drake et al's (1999) findings and what is suggested by incentive and culture theories warrants further investigation. The objective of this study is to explore the difference between the conclusions drawn from Drake et al (1999) and the propositions put forward by culture and agency theories. With the aid of a reward typology (Chiang and Birtch, 2005; 2006), we argue that the compensation schemes used in Drake et al (1999) study do not reflect the choices faced by decision makers when selecting compensation schemes, thereby introducing the potential for a false choice fallacy.

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<sup>2</sup> The U.S., together with Australia, United Kingdom, and Canada are classified by Hofstede (1993) within the Anglo country cluster based on Hofstede's (1980) four cultural dimensions: Individualism-Collectivism; High-Low Power Distance; Masculinity-Femininity; and High- Low Uncertainty Avoidance.

<sup>3</sup> Refer also to Redding and Wong (1986); Kirkbride & Westwood (1993); Cable and Judge (1994).

<sup>4</sup> Agency theory implicitly assumes that all individuals (regardless of nationality) act predictably in a rational and self interested manner under same incentive structure (Jensen & Meckling, 1976; Holmstrom, 1979; Brown et al, 2007).

We replicate Drake et al's (1999) ABC experimental task in an Anglo country with a critical exception; we use an individual profit compensation scheme rather than a rank order tournament for the following reasons. Although theory and empirical evidence suggest that rank order tournaments and individual compensation schemes share the characteristic of increasing attention and effort on individual, rather than collective performance (Ranking and Sayre, 2000), they are different because tournaments involve overt relative performance evaluation. Relative performance evaluation can lead to gaming behaviour including sabotage (Wruck and Jensen, 1994). Therefore, a comparison between group compensation and tournament compensation schemes may not represent an efficient comparison between two diametrically opposite extremes, rather two different types of compensation.<sup>5</sup> We suggest that by including tournament instead of a generic individual piece rate scheme, the results of Drake et al (1999) have limited generalizability and are easy to misinterpret. One may conclude that Drake *et al* (1999) provide evidence that group compensation is an efficient choice of compensation scheme relative to individualistic schemes in information rich environments. This raises the potential for a false choice fallacy, whereby in an effort to implement ABC, managers may use group compensation as per the recommendations of Drake et al (1999) without considering the potential efficiency of plain vanilla individual compensation schemes. Given that group and individual compensation schemes are used in practice, replication of Drake et al (1999) using those schemes would provide results with improved generalizability, reducing the bias of a false choice.

The research design is a controlled experiment using human subjects based on the simulated production task developed by Drake et al (1999). A sample of sixty six students were recruited at a large Australian university business school. Participants were randomly allocated to groups of three and given a production task involving building LEGO<sup>TM</sup>

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<sup>5</sup> Differences in incentives provided by plain vanilla individual compensation schemes and rank order tournament schemes provide scope for differing behaviours, and in turn differing levels of efficiency. For example, if a worker is performing below average under a piece rate individual compensation scheme, they still have an incentive to work as there is a linear expected pay-off from their individual effort. On the other hand, under a rank-order tournament, underperformers have an incentive to work even less as the probability of achieving a high rank diminishes. This is because the expected pay-off is significantly reduced. It is perhaps for this reason that few, if any, firms employ rank order tournaments as the only form of compensation (the authors are unaware of any firm that has implemented a rank order tournament as the sole incentive scheme). A common form of rank order tournaments adopted by firms is the promotion tournaments where there fewer higher paying promotion opportunities relative to the staff seeking promotion (Baker et al, 1988).

structures in a simulated assembly line. Participants were given performance feedback using an activity based costing system. The manipulation was in the form of different incentive structures, being either an individual or group compensation structure.<sup>6</sup> To assess differences between treatment groups, the number of observed task innovations and work unit profits are compared, consistent with Drake et al (1999).

This study contributes to cultural and incentive theory development by providing insight into the impact of cultural values on employee responses to different incentive schemes. If indeed workers perform better given an individual compensation scheme, one may conclude that cultural values moderate the relationship between the type of compensation scheme and organisational performance. On the other hand, if the results show group compensation elicits better performance this suggests that national culture has little impact on the relationship between type of compensation scheme and organisational performance which is consistent with Drake et al (1999).

Results based on sixty six Australian born university students provide support that in an information rich task such a Drake et al's (1999) experiment, profitability is higher using an individual compensation scheme, relative to a group compensation scheme. This is explained by a greater link between effort and rewards as well as a cultural preference for individual compensation schemes. Further, there was no difference in the number of either individual or group innovations between compensation scheme types. These findings contrast with Drake et al (1999), providing support for the proposition that positioning dichotomous relations within a broader typology can lead to radically different findings.

This paper is organised as follows. Section 2 contains the literature review and theory development, Section 3 discusses the research design, Section 4 presents the results and discussion and section 5 contains the conclusion and limitations.

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<sup>6</sup> One type of individual incentive structure is tested, being *individual profit*. One type of group incentive structure is tested, being *group pooling of profits*.

## **2 Literature review and theory Development**

### *False Choice Dilemma*

The problems associated with the allocation of scarce resources in designing experimental research increases the potential to construct an argument that contains a logical fallacy. A fallacy can be defined as “a pattern of reasoning that can lead from true premises to false conclusions” (Tymoczko and Henle, 1995, p. 242). From the time of the ancient Greeks, identified logical fallacies play an important role in the philosophy of science. For example, a logical fallacy that plays a prominent role in the modern philosophy of science is drawing generalizations from a sample that is not representative of the population.

The false choice fallacy has particular relevance to experiment design choices. The false choice is classified as an informal fallacy of relevance (Pirie, 1985). Although we use the term false choice, this type of fallacy has various names in the literature.<sup>7</sup> The main logical argument used in experimental research that is prone to a false choice has the following form:

A or B are alternatives

Not A because of X

Therefore B is the preferred alternative

This argument is common in experimental research and can be rephrased as:

A or B are alternatives

Because of X, B is expected to perform better than A.

B performs better than A in controlled experiment

Therefore B is the preferred alternative.

As the false choice fallacy is an ‘intricate argument’ (Pirie, 1985), definitions have some variation, with some definitions focusing on one or several logical problems.<sup>8</sup> A general definition is “considering a distinction or classification exclusive and exhaustive when other

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<sup>7</sup> For example, false alternative (Yanal, 1988, p234), bogus dilemma (Pirie, 1985, p 25), false dilemma or faulty classification (Fearnside and Holther, 1959, pp 32, 36), bifurcation (Engel, 1994), either/or fallacy (Engel, 1994), black-and-white fallacy (Chase, 1956; Engel, 1994), fallacy of selection (Herrick, 2005, p 252).

<sup>8</sup> Ibid

alternatives exist” (Engle, 1994). The argument is constructed by offering several actions (or alternatives) and articulating the consequences of those actions. Since one of the consequences is superior, the argument forces a preference choice favouring the associated action. Comparing tradeoffs between alternative choices in the form of a dilemma is a valid form of argument and by itself does not constitute a false choice. However, when the alternative choices do not reflect the range of possible choices, the argument becomes a false choice (or bogus dilemma) (Pirie, 1985).

The false choice fallacy can manifest itself in different ways. First, when alternative choices are offered, where those choices are not actually alternatives. For example, offering someone the choice between a steak or an apple to make up their dietary intake of fruit for the day. Second, by limiting the alternative choices. For example, in trying to establish which fruit is the tastiest, comparing apples and oranges only, excluding bananas and other types of viable alternatives. Third, by presenting choices as mutually exclusive, when they are not necessarily so. For example, offering the choice between an apple and an orange when having both is an alternative. The examples used are obvious exaggerations; however it is easy to see their relevance to experiment design, as discussed below.

It is important to note that the false choice may be intentional or unintentional. For example, an unintentional dilemma may be presented where the author is unaware of other alternatives or by believing the alternatives are exclusive when they are not (Fearnside and Holther, 1959, p 39). On the other hand, sales people and frauds often offer a false choice when trying to manipulate someone into committing to a sale (for example: see McMahon and Jamison (1989, pp 118, 119) or any high pressure sales manual that discusses ‘closing’ the sale). The sales person does not explicitly articulate that the choices offered are the only choices, but the person interpreting the choices often interprets the alternatives as the only viable alternatives (Fearnside and Holther, 1959).

Consideration of the false choice fallacy has relevance for experiment design as resource constraints force researchers into making tradeoffs in selecting alternatives to compare. If alternatives do not reflect the range of available alternative, the findings from the research are at best biased and at worst, misleading.



### *False choice and theorising incentives*

We suggest that the development of a typology of alternatives is a potential solution to reduce the level of bias introduced in the selection of alternatives in experimental research. There are a number of reasons for this. By articulating all available alternatives, the researcher (and the reader) is consciously aware of and can make explicit tradeoffs between alternatives. The limits to generalizability are then more apparent. By articulating those alternatives that are mutually exclusive or continuous, alternatives can be framed in the appropriate context. Thereby, tradeoffs that are actually tradeoffs are explicitly recognised.

The development of a typology of incentives has another practical advantage. As the body of evidence amasses around the typology, a general theory can be proposed based on empirical evidence. This would be especially useful in the area of incentives, due to the complex web of extant research. Theories that are not able to be generalized would be more apparent, and related contextual factors would be easier to articulate. Chiang and Birtch (2005, 2006) provide such a typology. They draw a dichotomous relation between group and individual based reward allocation (see figure one). This is consistent with prior literature that identifies a dichotomous relation between individual and group compensation schemes (London and Oldham, 1977; Bushman, Indjeikian and Smith, 1995; Keating, 1997; Rankin, 2004; Brown et al, 2007). Group and individual compensation are dichotomous, with many observed combinations of compensation schemes sitting at either end of, or on a continuum between these two extremes (Welbourne and Gomez Mejia, 1995; Brown *et al*, 2008).

<INSERT FIGURE 1>

As Drake *et al* (1999) identifies group compensation and tournaments as alternatives, the question is raised as to which incentive scheme results in the greatest performance; group, individual or tournament. As discussed below, as tournaments are not observed in practice as alternatives, comparison between individual and group compensation schemes has more

relevance to practice.<sup>9</sup> The following section considers the role of incentives to firm performance.

### *Incentives and Organisations*

Incentive structures are relevant to organisation design and performance across all levels of the firm. A number of perspectives in the economics and management literature propose that unless incentives are managed appropriately, firm performance may suffer (Donaldson, 2001; Jensen and Meckling, 1976; 1992; Wright, 2005; Brown et al, 2008). The relevance of incentive structures is evidenced also by the importance places upon incentives across different theories used to understand firms. The firm has been understood by considering incentives from the perspective of participative management, expectancy theory, need theory, operant conditioning, social dilemma, equity theory, structure factors, contingency theory, social theory, agency theory and prospect theory (Welbourne and Gomez Mejia, 1995). All of these theories consider incentives important in understanding the firm and firm performance.

The theory base utilised in understanding how incentives relate to performance has been informed by case studies where people within firms have explicitly expressed the relevance of incentives and rewards (Welbourne and Gomez Mejia, 1995). Further, the focus on incentives and rewards is a large part of management education (Robbins, Bergman and Stagg, 1997; Clegg Kornberger and Pitsis, 2005; Langfield-Smith, Thorne and Hilton, 2006), creating a feedback loop that some may consider as interactive.<sup>10</sup> Therefore, an understanding of different incentive structures is important when designing firm and task structure, corporate governance and human resource decisions. The penalties for inefficient incentive structures in organisations include poor performance due to moral hazard, adverse

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<sup>9</sup> Another dichotomy is between tournament and compensation based on equity theory (Main, O'Reilly and Wade, 1993; Henderson and Fredrickson, 2001 and Carpenter and Sanders, 2004). The difference between these is the extent to which compensation levels differ between workers. Under equity theory compensation is maintained at levels relatively similar between workers to preserve equity, thereby focusing on similarity. At the other extreme, large differences between worker compensation levels are exploited to encourage increased work effort to attain higher relative performance. Although theoretically it is evident how these contrast with each other, empirically it is not immediately apparent as to the extent these diametric opposites are explicitly considered by managers when constructing compensation contracts.

<sup>10</sup> Practice informing theory and theory informing practice.

selection of performance measures, and employee cognitive dissonance among other costs. Compensation schemes are one incentive mechanism that has received considerable attention in organization research.

### *Compensation and Incentives*

The relation between incentives and compensation is one of the most researched topics in the management literature. The literature has identified many different types of compensation schemes, making it difficult to compare and synthesise the literature. These different types of compensation schemes include individual versus group reward systems, budget versus subjective based bonuses, long versus short term incentive schemes to mention a few. In an effort to synthesis and position their research, Chiang and Birtch (2005, 2006) have developed a typology or Type-System-Criterion (TSC) framework that explicitly considers the dichotomous relation between individual versus group reward systems (see figure one). Below we consider the theory base of this dichotomy.

According to Chaing and Birtch (2005, 2006), rewards and in turn incentives, can be allocated based either on a group or individual basis (refer to figure one).<sup>11</sup> An incentive structure is classified as individual when the reward is allocated based on individual merit and classified as group incentive when the reward is received contingent on satisfying a common goal (Drake et al, 1999; Welbourne and Gomez Mejia, 1995; Brown et al, 2008). This is a dichotomous relation, with incentive packages sitting on a continuum between the extremes of group or individual based compensation (Brown et al, 2008). Where only one performance measure is used to allocate performance based incentives, there may be a clear trade off between measures based on group performance and measures base on individual performance. For example, choosing between an individual piece rate or a profit share scheme. Alternatively, incentive compensation can be allocated based on a package of performance measures where there is an implicit trade off between group and individual compensation (Brown et al, 2008). For example, offering both piece rate and profit share

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<sup>11</sup> This is consistent with prior literature that identifies a dichotomous relation between individual and group compensation schemes (London and Oldham, 1977; Bushman, Indjejikian and Smith, 1995; Keating, 1997; Rankin, 2004; Brown et al, 2008).

compensation. The question becomes, what proportion of individual versus group based rewards provides the incentives sought by the compensation package.

Within traditional economic theories such as agency theory there is a focus on incentive structures that emphasise individual performance measures, which often results in competition between employees (Che and Yoo, 2001; Brown et al, 2008). For example, in agency theory there is an assumption that employees act in their own self-interest and that incentives are provided to motivate employees to exert effort on activities that benefit the firm, rather than exert effort on activities that benefit themselves (Jensen and Meckling, 1976). A simple example of an incentive structure which emphasizes self-interest is an individual piece rate incentive (Cadsby et al, 2007), where a worker's reward is related to individual output in the current period (Lazear, 1986).<sup>12</sup> Piece rate compensation can be an effective incentive because it rewards employees who exert more effort, while identifying those employees who are not (Lazear, 1986).

The extent to which competition is induced between employees under a piece rate plan is related to the second point, the identification of the relative performance of employees. By combining individual compensation and relative performance information, management can induce competition between employees. Tournament incentives, as used by Drake *et al* (1999), can also be classified as individual because rewards are distributed contingent on individual performance, albeit relative to others (Brown et al, 2008). Tournament incentives however differ to individual piece rate incentives because rank order tournaments explicitly promote competitive behavior amongst employees. Lee et al (2005) outlines the main elements of tournament theory: (i) Players are rewarded with prizes based upon relative performance (ii) rewards are intrinsically nonlinear; (iii) the spread in prizes increases with the number of the competitors; (iv) participants with low ability will choose higher risk strategies to increase the probability of winning; and (v) the disincentive effects of mixed tournaments can be reduced by handicapping the more able players or by sorting players into tournaments of homogenous ability (Lee et al, 2005).

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<sup>12</sup> This can be compared to the fixed salary component of compensation, where the workers' pay is independent of the current period's output (Lazear 1986).

In practice, the most common form of a tournament incentive occurs when rewards are indivisible (Drake et al, 1999), for example, in the case of a promotion tournament. In this case, only one worker out of many competing candidates may receive the promotion. Promotion falls under the non-financial reward type, however tournament incentives can also be provided under the financial reward type (for example, a cash bonus might be provided to the highest performing worker). The impact of culture on tournament incentives will not be tested here as the associated actions and behaviors are more like to be related to non-cultural factors (Sutherland, 1987).

Alternatively, the use of group compensation schemes has been observed across all levels of the organization, from low skilled workers, divisional managers and senior executives (Welbourne and Gomez Mejia, 1995; Bushman, Indjejkian and Smith, 1995; Brown et al, 2008). Group compensation is where there are interdependencies in performance measurement between different people, with a focus on common incentives (Brown et al, 2008). For example, in the manufacturing industry, workers have been compensated using a bonus pool related to the number of total units produced, total cost savings or value added activities across the business unit (Welbourne and Gomez Mejia, 1995). Although a review of the literature finds support for the general proposition that group compensation increases employee involvement and in turn productivity gains in the manufacturing sector, how group compensation operates at the micro level is not well understood (Welbourne and Gomez Mejia, 1995). This is in part because case studies and surveys are often cross sectional, making causal linkages difficult to determine (Ibid).

The above discussion suggests that group compensation may not necessarily be more efficient than individual compensation in an information rich environment (Brown et al, 2008). Also, the above section suggests that there is a trade off between group and individual incentives and that they are alternative compensation schemes in motivating employees to work harder (albeit, with different incentives). Given that tournament incentives may not be a direct alternative to group compensation, the findings from Drake et al (1999) lose some generalizability. This is because they have compared alternatives that are alternatives in theory, not practice; instead of choosing alternatives that are actual alternatives faced by managers. Therefore, it is not apparent as to whether Drake et al's (1999) findings are generalizable, other than to say that highly competitive compensation may be inefficient. The following section discusses evidence from theories of national culture that suggest

individual compensation is preferable to group compensation for the U.S. and other countries in the Anglo cluster.

*Cultural and Economic Underpinnings of Incentive Structures in Anglo Countries*

It is difficult to develop incentive theory without explicitly considering the cultural underpinnings of existing incentive theories.<sup>13</sup> A number of studies, predominantly in the management (Huo and Steers, 1993; Kowtha and Leng, 1999; Johnson and Droege, 2004; Chiang and Birtch, 2006) and psychology (Chen et al, 1997) literature have examined the cultural underpinnings of incentive structures. In the accounting and economics literature there is a substantial body of research on incentives (Gibbons, 1998; Prendergast, 1999; Che and Yoo, 2001; Bonner and Sprinkle, 2002) however there has been little consideration of national culture. While not looking specifically at incentives, a number of accounting studies have highlighted the importance of national culture in accounting research (Gray, 1988; Harrison, 1993; Brewer, 1998; Chow et al, 2000; Hope, 2003; Lanis and McFarling, 2004).

Traditional economic theories such as agency theory implies that group incentives structures are not efficient there will be individuals in the group who free-ride (Alchian and Demsetz, 1972; Holmstrom, 1979, 1982; Brown et al, 2008). Therefore, the use of a group incentive structure is a departure from one of the fundamental assumptions of agency theory (rational self interest) (Che and Yoo, 2001). Johnson and Droege (2004) suggest that this departure may be due to agency theory paying little attention to the “co-operative aspects of social life”, a notion which is important in group incentives structures. In contrast, individual incentive structures, which are more consistent with the assumptions of agency theory, do not explicitly encourage co-operation (Hansen, 1997; Che and Yoo, 2001). The lack of incentives to co-operate may be problematic for tasks where co-operation is desirable (Brown et al, 2008).

Individual incentive structures are consistent with the assumptions of agency theory that goals, rational self-interest and risk preferences diverge between employers and employees, with individual incentives designed to promote effort and discourage shirking (Holmstrom, 1979; Johnson and Droege, 2004). These assumptions are supported by empirical evidence

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<sup>13</sup> We take a very broad view of theory here, meaning any proposition that links more than one object together.

and they are deeply rooted in Anglo value systems, with most of this evidence based on samples taken from Anglo cultures (e.g. Stroh et al, 1996; Ghosh and John, 2000).

Consistent with the above proposition that culture has influenced theories of the firm, a number of studies have considered whether different cultures have different preferences for different compensation schemes (Kim et al, 1990; Chiang and Birtch, 2005). As different cultures are proposed to have different preferences for incentive systems, researchers have considered whether these different preferences lead to different behaviors. For example, Chow, Shields and Wu (1999) propose that cultural individualism versus collectivism moderates the relation between task and incentive independencies. Although they claim that national culture is an omitted variable in management control system literature, they fail to provide conclusive evidence supporting their proposition. The question of whether and how national culture influences the effectiveness of different incentive schemes has not been resolved and is discussed below.

#### *National culture*

The topic of culture has stimulated epic debate in the management literature. On the one hand, national culture is defined as “the collective programming of the mind which distinguishes the members of one human group from another” and is considered to be relatively stable over time (Hofstede, 1980 p 25).<sup>14</sup> On the other hand, some theorists argue that culture is ephemeral and impossible to quantify, with effort to quantify culture seen as an attempt of various groups in society to dominate, rather than reflections of an objective reality (Clegg *et al*, 2005). The relative merit of this debate for this study can be assessed by considering how the dominant theoretical framework of national culture has been constructed.

The theoretical framework for national culture utilised in this paper is based on Hofstede’s (1980) work where he identified four dimensions (societal values) of national culture (a fifth

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<sup>14</sup> Similarly, Rohner (1984) defines national culture as ‘a system of meanings in the heads of multiple individuals within a population’.

dimension was subsequently added). In order to quantify a set of ‘work-related values’,<sup>15</sup> Hofstede surveyed a sample of 116,000 workers from IBM subsidiaries in 40 countries.<sup>16</sup> These workers appeared to be identically matched in their working environment except for their nationality. Statistical analysis of the IBM data revealed four ‘societal values’ which Hofstede termed ‘dimensions of culture’. Hofstede’s (1980) four dimensions are individualism/collectivism, masculinity/femininity, uncertainty avoidance and power distance (see table one for a summary of these dimensions).

<INSERT TABLE 1>

Hofstede’s dimensions of national culture have been used as a theoretical framework in a significant portion of the extant cross-cultural research (Kirkman et al, 2006; Ng et al, 2007). Hofstede’s dimensions are also considered to be the dominant theoretical framework in cross-cultural accounting research. For example, Gray (1988) developed a framework for the influence of culture on accounting based on Hofstede’s four initial dimensions of national culture.<sup>17</sup> A number of studies have tested Gray’s framework and found that culture is an important factor in the specific areas of disclosure (Zarzeski, 1996; Hope, 2003) and actual financial reporting practices (Salter and Niswander, 1995).<sup>18</sup> For an example in the area of management control systems, see Harrison and McKinnon (2002).

Despite frequent use both generally and in the accounting literature, Hofstede’s dimensions of national culture have attracted a number of criticisms. One such critique is that Hofstede reduces culture to an overly simplistic five dimension conceptualisation (Sivakumar and Nakata, 2001; Baskerville-Morely, 2005; Kirkman et al, 2006). Another critique is that nations are not the best units for studying culture (Baskerville-Morely, 2005). This is acknowledged by Hofstede (2002) himself; however he argues that nations are the only kinds of units that can be used to enable comparison. However, it must be noted that Hofstede’s

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<sup>15</sup> Hofstede (1980) views ‘work related values’ as core cultural values. This term is used interchangeably with ‘societal values’.

<sup>16</sup> Hofstede (1983) later added 10 more countries and three regions to his original framework.

<sup>17</sup> The accounting values identified by Gray (1988) include professionalism versus statutory control, uniformity versus flexibility, and conservatism versus optimism and secrecy versus transparency.

<sup>18</sup> Using data from 29 countries, Salter & Niswander (1995) found that Gray’s model has statistically significant explanatory power when used to explain actual financial reporting practices.



dimensions have been empirically supported at both the individual and organisational levels of analysis (Kirkman et al, 2006).

Additionally, Hofstede's framework has been criticised for: limiting the sample to a single multinational corporation (IBM); failing to capture changes in culture over time; and ignoring within-country cultural differences (Sivakumar and Nakata, 2001). Despite these criticisms, Hofstede's framework has remained favoured by researchers due to its "clarity, parsimony and resonance with managers" (Kirkman et al, 2006). Hofstede's dimensions are thus utilised in this study for four main reasons. Firstly, this study is not aiming to identify additional dimensions, but test the strength of Hofstede's dimensions in the area of incentives. Secondly, the incentive structure classifications of individual and group closely correspond with Hofstede's national culture dimension of individualism/collectivism. Third, an alternative theoretical framework has not been developed to supersede Hofstede. Four, although dimensions of culture are not necessarily predictive of individuals values, this is not the interest in our study. We are concerned with average values and dimensions of culture provide this.<sup>19</sup>

Hofstede (1980) labelled his factors *cultural dimensions*, each purported to represent a universal descriptive characteristic of a society (see table one for a summary of Hofstede's cultural dimensions). Evidence from Hofstede (1991, p. 53) indicates that the countries with the highest IDV values (individualists) are Anglo countries including the United States, Australia, United Kingdom and Canada. In these countries, individual achievement is highly valued and rewarded (Tosi and Greckhamer, 2004). Consistent with agency theory, Hofstede (1991) suggests that in individualist societies it is expected that workers will act according to their own self-interest and work should be organised in such a way that aligns their interests with that of the firm. Therefore, incentive structures that are classified as individual, such as piece rate incentives, would be preferred by workers in an Anglo setting.

In addition, Anglo countries are classified as having an internal locus of control which is (high individualism and low power distance). Therefore, according to Chiang and Birch

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<sup>19</sup> By construction, more than fifty percent of the population share the value attribute.

(2005) “. . . they prefer rewards that are based on their behaviour (Miceli and Lane, 1991; Cable and Judge, 1994).” Complementing that suggestion is that Anglo countries are Masculine and relatively low on the Uncertainty Avoidance (Newman and Nollen, 1996; Beer and Katz, 1998), characteristics that align with individualism.

Tosi and Greckhamer (2004) found a positive relationship between the level of individualism in a society and CEO compensation, in particular the total and variable components. They suggest that this may be a result of the compensation schemes of firms in individualistic countries having greater performance risk being transferred to CEO's. Thus, compensation schemes in individualistic cultures are likely to have individual characteristics.

Newman and Nollen (1996) provide evidence which suggests that when management practices 'fit' better with the national culture, higher (financial) performance is observed in comparison to a situation where the fit is not as good. Therefore, when an incentive structure 'fits' with an individual's cultural values, higher performance should be observed when compared to an individual that has been given an incentive structure that does not 'fit' with their respective cultural values.

Hofstede (1991) suggests that incentives or bonuses which are linked to an individual's performance are more appropriate to a person's skill set and routines in an individualist society relative to a collectivist society. Thus, in an individualist society an individual incentive structure would allow the employee to pursue their own self-interest by exerting maximum effort on activities that will benefit both him or herself and the firm. Against that background we restate the Drake et al (1999) hypothesis given the cultural values and the prevailing economic theory in the Anglo countries and using an individual compensation scheme as a proxy for individual compensation.

The discussion reveals a tension between society wide values of individualism and the explicit incentives induced by reward systems within the context of the task. Given a task where there are significant gains from both individual and group innovations that increase each participant's payoff, there is no reason to expect any difference in the number of

individual or group innovations under either group or individual compensation scheme if under both schemes.<sup>20</sup> Individualistic preferences (or cultural values) provide an incentive to engage in individual or group innovations that promote the individuals welfare, regardless of the incentive scheme in place. Therefore, if the task structure allows for group innovation to increase individual payoffs, participants have an incentive to engage in group innovations to the extent that those innovations increase their payoff. Therefore, we propose H1, that the incentive will have little impact on the number of cooperative or individual innovations in a task where both individual and group innovations promote the welfare of individuals.

Hence we restate Drake et al (1999) hypotheses as follows:

H1a: The incentive structure has little effect on the number of cooperative innovations undertaken such that:

$$COOP_{abc,grp} = COOP_{abc,ind}$$

H1b: The incentive structure has little effect on the number of individual innovations undertaken such that:

$$IND_{abc,grp} = IND_{abc,ind}$$

According to Drake et al (1999), efficiency and profitability were higher when a group incentive structure was used<sup>21</sup> (in combination with an activity based costing system<sup>22</sup>). However, the above discussion which related to the societal values prevalent in Anglo countries and of agency theory suggests that workers in an Anglo country will exert more effort given an individual compensation scheme and hence achieve greater corporate

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<sup>20</sup> If there were significant gains from group innovations that did not benefit some of the individuals involved under an individual compensation scheme, then the group compensation scheme would likely be more efficient as it would encourage participants to engage in group innovations (Brown et al, 2008). However, in the context of Drake et al's (1999) experiment, individuals do benefit from group innovations through reduced cost and increased efficiencies.

<sup>21</sup> This is supported by Hofstede (1991 p. 63) who indicates that "if the work group functions as emotional ingroup, incentives and bonuses should be given to the group, not to individuals." It is also supported by Huo and Steers (1993) who proposed the higher the 'degree of team spirit', group based incentives will be more effective than individual based ones in motivating workers.

<sup>22</sup> Like Drake et al (1999), group incentives are be studied in an information rich activity based costing context.

efficiency and profitability. Second, Brown *et al* (2008) suggest that in information rich environments, where inputs and outputs of a process are readily observable, individual compensation will be more efficient as there is a tighter nexus between effort and reward. On the other hand, for the benefits of group compensation to outweigh the costs associated with such a plan, there needs to be significant gains from co-operation, co-ordination and information sharing that do not benefit some of the individuals involved under an individual compensation scheme (Brown *et al*, 2008).<sup>23</sup> However, in the context of Drake et al's (1999) experiment, individuals do benefit from group innovations through reduced cost and increased efficiencies. However, it is apparent that with more effort, the level of activity will drive plant profit higher. Therefore, with culturally individualistic participants and a task without explicit gains from co-ordination, co-operation and information sharing we propose H2. Hence we restate Drake et al (1999) hypotheses as follows:

H2: The incentive structure has an effect on plant profit (PROFIT) such that:

$$\text{PROFIT}_{\text{abc,grp}} < \text{PROFIT}_{\text{abc,ind}}$$

We expect each hypothesis to hold irrespective of the costing system. Therefore, we do not include volume based costing (VBC) in the analysis. In addition according to Drake et al. (1999), the greatest difference between innovations, efficiency and profitability, given a particular compensation scheme, relates to Activity Based Costing (ABC).

### **3 Research Design**

In order to test the above hypotheses, the research design needs to compare differences in behaviour between groups drawn from a culturally individualistic population given either group or individual incentive structures. The number of individual and group innovations as well as task performance needs to be measured, whilst remaining consistent with Drake et al (1999). In order to satisfy the above conditions, the experimental design is based on the

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<sup>23</sup> The structure of Drake et al's (1999) information rich (ABC) task does not allow for manipulation of these variables making the relative efficiency of group compensation difficult to conclusively target.

simulated production task initially performed by Drake et al (1999) and subsequently used by Wynder (2004).<sup>25</sup>

Under the individual incentive structure, incentive compensation was determined using an individual profitability scheme and the group incentive was a group pooling of profits. The individual profitability scheme is not dissimilar to piece rate, whereby the worker is compensation based on their output in the current period. Traditionally, under a piece rate scheme, output is measured by the number of units produced by the worker. However, this was not considered appropriate in this task because it would result workers disregarding any form of cost reduction. Hence, an individual profitability scheme was used, which took into account both output (number of units produced) and associated costs for each individual.<sup>26</sup> Under the group incentive structure, a group pooling of profits scheme was used to allocate incentive compensation, whereby each individual's profitability was summed and divided equally between all team members. All subjects were given a financial incentive to participate in the experiment and increase their motivation while performing the task. Subjects received a gift voucher valued between ten and twenty dollars for participating in the experiment, with the final amount being contingent upon performance in the task.<sup>27</sup> The gift voucher was emailed to subjects following completion of the experimental task.

Performance is the dependent variable and is measured using each team's total profitability, as this is the primary goal of any profit-making organisation.<sup>28</sup> In the treatment groups where the incentive structure 'fits' with the respective cultural values, higher performance are expected to be observed when compared to the treatment groups that have been given an incentive structure that does not 'fit' with the respective cultural values (Newman and Nollen, 1996). The DHR experiment had three types of independent variable: innovation, productive efficiency and profitability. This study utilises two of these. Efficiency is excluded as it is

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<sup>25</sup> For the remainder of this section, the Drake et al (1999) experiment will be referred to as the 'DHR experiment'.

<sup>26</sup> Drake et al (1999) used a different type of individual incentive structure, a rank order tournament scheme.

<sup>27</sup> The use of gift vouchers as a financial incentive is consistent with prior research (Booth and Schulz, 2004; White, 2007).

<sup>28</sup> During the experiment, data was collected to allow sensitivity testing of three alternative dependent variables: individual innovations, group innovations and efficiency (cost per unit).

captured in profitability (the hypotheses two test was replicated using the DHR measure of efficiency with the same result as using profitability).

The DHR experiment examines process innovation in work teams and classifies *innovations* as either individual or co-operative. Co-operative innovations require the coordination of at least two team members, whilst one person can carry out an individual innovation. An example of a group innovation is where participants change the order of production or share work areas. An example of an individual innovation is where participants carry more than one work-in progress from the warehouse to their work area or if they work on more than one unit at a time. DHR proposed that higher performance will be achieved by a high number of innovations.

While the task itself remains fundamentally the same to the one used in the DHR experiment, this experiment differs to the DHR study in a number of ways. These differences have a number of implications for the proposed experiment. First, the DHR experiment used a 2x3 factorial design while this study utilises a 2x2 factorial design. The DHR treatment groups included two incentives structures (GRP and Tournament), two costing systems (activity-based and volume -based) and a period effect. This study includes only one costing system and two incentives structures (GRP and IND) and a period effect. Tournament incentives and volume based costing are not necessary for testing of the hypothesis. Therefore, given resource constraints, they are not included as part of this study. Also, in the DHR study, the most extreme differences between the incentive structures were observed when treatment groups were given the ABC information as opposed to the VBC information. In this study, the costing system is not relevant. Therefore, all treatment groups will be given ABC information, reflecting an information-rich environment.

Second, Drake et al (1999) collected the number of group innovations on an individual basis, whereas we have collected the number of group innovations on a group basis. The reason for this choice was to reduce the amount of information recorded during the limited experiment period to reduce errors of omission. Therefore, the number of group innovations figure is not directly comparable to Drake et al (1999).

### *Sample*

A total of 66 subjects participated in the experiment, which gives the same level of statistical power as the Drake et al (1999).<sup>29</sup> Subjects were recruited from business subjects at an Australian university. The total sample included 66 students born and educated (up to high school) in Australia. The characteristics of the sample are summarised in Table 2. The sample consisted primarily of female subjects, with females accounting for 59% of the total sample (compared to 41% for males). The mean age of participants is 19.86 years. Most participants had had some prior team work experience with 89% of participants having prior team experience in an educational environment and 82% in a work environment.

<INSERT TABLE 2>

As culture is one of the independent variables, the subjects were carefully screened to ensure they were not international students. Development psychologists advocate that by the age of 10, most children have their basic value systems in place (Hofstede, 1991). Hofstede suggests that because the values were acquired at such a young age, these values often remain ‘unconscious’ to those who hold them. Consequently, any changes in values after the age of 10 are difficult to make (Hofstede, 1991). Therefore, in order to be eligible for the Australian treatment group, subjects were screened to ensure that they were born and completed high school in Australia in order to increase the likelihood that their basic value system was rooted in Australian culture. Any subject that did not meet the eligibility criteria was discarded from the sample. After eligibility was confirmed, subjects were randomly contacted and allocated to a timeslot for the experiment based on their availability. Contact methods included voice calls, text messages and email.

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<sup>29</sup> This sample size is also consistent with Booth & Schultz (2004), who used 131 subjects in a 2x2 factorial design laboratory experiment.

### *Experiment Task Description*

The task required subjects, in groups of three, to assemble a product from LEGO<sup>TM</sup> blocks. Each experiment was conducted in a university classroom which had the necessary audiovisual and furniture required for the task. The experimental setting was organised like a production ‘plant’, with three work areas (for each participant) and a ‘warehouse’ (refer to Figure 2). The product was made in three separate stages (refer to Figure 3), with each worker completing and adding a sub-assembly made with LEGO<sup>TM</sup> blocks of three different colours (blue, red or yellow).

<INSERT FIGURE 2>

<INSERT FIGURE 3>

Present in the room with the three subjects was a ‘quality control inspector’ (QCI) and a ‘quality control assistant’ (QCA). Upon arrival to the room, subjects were randomly allocated a name tag which identified them as either the blue, red or yellow assembler. They were then presented with worker information sheets which contained the instructions for the task. These instructions were also presented to the subjects in the form of an instructional video, which ensured that all subjects were presented with the information in an identical manner. There were two variations of the worker information sheets and instructional video, one for each treatment group (individual and group compensation).

The task instructions presented in the worker information sheet and the instructional video were based on those used in Drake et al (1999, 2001). Changes were not made to the task; however the instructions were presented differently. The materials were first prepared and pilot tested on two Australian teams (one group and one individual compensation group). After pilot testing, adjustments were made to ensure the instructions were as clear as possible. Further pilot testing (another two Australian teams, one group and one individual compensation group) was conducted and confirmed that the instructions were satisfactory. The results for these four pilot groups were not included in the final sample and results.

The worker information sheet and instructional video consisted of four sections: i) manufacturing process ii) plant operation and rules iii) revenues and costs and iv)



compensation. The subjects were told that they were working for a manufacturing company called 'Block Limited'.

In the first section, after receiving instructions about the current manufacturing process of Block Limited, subjects were asked to physically demonstrate (one at a time) the production process. The QCI observed the demonstration and corrected the assemblers on mistakes (if any) to ensure that all three subjects were competent at building the LEGO product.

In the second section, the subjects were informed of the operating procedures and rules of Block Limited. At the start of each production period, there are three completed blue assemblies and three completed red assemblies in the warehouse so that the red and yellow assemblers can begin work at the start of the period. These do not count towards output or revenue at the end of the production period. At the end of each period, the QCI examines assemblies to ensure they have been completed correctly. The plant rules are outlined in Figure 4.

<INSERT FIGURE 4>

In the third section, the revenues and expenses associated with production was explained to the subjects. Each completed assembly (blue, red or yellow) was worth \$1.00 in sales revenue. Hence, each finished good (which contained a completed blue, red and yellow assembly) was worth \$3.00 in sales revenue for Block Limited. There were three production costs. The warehouse storage cost was \$1.00 per storage bin used, the work area charge was \$2.00 per work area used and the inventory holding cost was \$0.50 per unused or incomplete assembly. An assembly was classified as unused if it was a completed blue or red assembly that had not yet been processed by the red or yellow assemblers at the end of the production period. For example, if the blue assembler had a completed blue assembly in the warehouse at the end of the production period and it had not been used by the red or yellow assemblers, then the blue assembler would be charged an inventory holding cost of \$0.50 for that assembly. An incomplete assembly was any assembly that had been started but not completed at the end of the production period. In relation to the previous example, if the red assembler had started production on the completed blue assembly then the red assembler would be charged the inventory holding cost of \$0.50.

The instructions in sections 1-3 were identical for all treatment groups, with the only difference being the instructions given to subjects in section 4 differed for the individual and group incentive treatments. All treatment groups were given a compensation scheme that consisted of a fixed component of \$10 and a variable component of up to \$10, paid out as gift vouchers. The variable component of compensation was a performance-based incentive scheme, with compensation being allocated differently in the individual and group treatment groups. Teams that were given an individual incentive structure were advised that their variable compensation is based on their individual profitability. Figure 5, Panel A is an example of how variable compensation is calculated under the individual structure. Those teams that were given a group incentive structure were directed that their variable compensation based on team profitability. Figure 5, Panel B shows that variable compensation is shared equally between all team members.

After receiving all the task instructions, the subjects were given five true or false comprehension questions to answer. These questions were designed to enhance student's understanding of sections 3 and 4 and were self-corrected by each subject. If any of the questions were answered incorrectly, subjects were given time to review their worker information sheets.

<INSERT FIGURE 5>

The subjects then began the first of four 'production periods' with three designated breaks in between these periods.<sup>30</sup> Each production period went for two minutes, with the subjects unaware of both the number and length of production periods to reduce endgame strategies. During each production period, both the quality control inspector and the quality control assistant observed and recorded any innovations that the subjects performed. During the designated break, both the QCI and QCA physically counted the number of assemblies that were completed by the work group. When finished counting, the figures of both the QCI and QCA were compared. If there were any discrepancies a second count of the assemblies took

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<sup>30</sup> At the end of the first production period (and the beginning of the first break), the subjects were informed that it was a practice period and any compensation earned did not count towards their final compensation amount.

place to ensure no counting errors were made. The QCI then prepared each assemblers 'compensation worksheet' while the QCA returned the plant to its original condition. While the subjects were reviewing their compensation sheets, the QCI and QCA reconciled their innovation recording sheets to ensure there was consensus in relation to the innovations performed. After the fourth production period, the subjects were informed that it was the last work period.

Finally, a questionnaire was given to each subject to complete after the final production period. The data from this questionnaire was used to for sensitivity testing. The questionnaire consisted of four sections: 1) demographic information; 2) task-related information (including two manipulation checks); and 3) Schwartz's Value Survey (SVS). Demographic information including gender, age, religion, ethnicity and political views were collected. The task requires subjects to work in teams; therefore subjects were asked whether they had previous exposure to a teamwork environment (either in paid employment or as part of an educational environment). Subjects were also asked to disclose whether they knew any of the other assemblers, quality control inspector or quality control assistant. The manipulation check questions are discussed in more detail below. Due to the possibility that personal values may influence an individual's performance under a given incentive structure (Harrison, 1993), subjects were asked to complete a values questionnaire, being Schwartz's competing values survey.

### *Manipulation Checks*

The final questionnaire included two manipulation check questions. Overall, 96% of the 66 subjects got at least one of these questions correct. Both questions were multiple choice, with the first having two alternatives and the second having seven alternatives. The first manipulation check question simply asked subjects to identify whether the variable compensation scheme that they were given was based individual output or group performance. The second question described a task-related scenario, and then asked students to identify how much compensation they would have received in the experimental task.

The results presented below include students who failed one or more of the manipulation checks. Robustness testing shows that the statistical results present in the next section are not significantly different after controlling for subjects who either 1) did not answer any manipulation checks correctly 2) answered question one correctly but not question two 3)

answered question two correctly but not question one 4) answered at least one manipulation check question correctly or 5) answered both manipulation checks correctly.

#### *Robustness testing*

Participants were randomly assigned to treatment groups, therefore it is not necessary to control for individual differences between participants. However, to ensure that the results are robust to the potential of other factors driving the results, potential covariates are added to both an OLS and stepwise regression model. The task requires subjects to work in teams, therefore previous exposure to a teamwork environment (either in paid employment or as part of tertiary studies) is included as a covariate. As Australia is a relatively young and multicultural country, ethnicity is also controlled for. Demographic information including gender and age was also collected. Due to the possibility that personal values may influence an individual's performance under a given incentive structure (Harrison, 1993), Schwartz's competing values survey (Schwartz and Sagiv, 1995) are used to control for differences in personality. Robustness testing reveals that no control factor is associated with the independent variables. The results of robustness testing are not reported (the personal values are yet to be tested. Results are forthcoming).

#### **4 Results and discussion**

In order to test the research hypotheses Analysis of Variance was used on the data presented in table three. In consistency with Drake et al (1999), team outcomes were used as the unit of analysis.

<INSERT TABLE 3>

Table three presents the means of the dependent variables by experimental condition for each period. A simple visual analysis of the means indicates that profitability is higher given an individual compensation scheme than group, which is the opposite of Drake et al (1999). A rudimentary visual analysis of the data suggests that all the hypotheses cannot be rejected as the difference in the number of innovations appears to be minimal.

<INSERT FIGURE 6>

### *Analysis of Variance (ANOVA)*

A two-factor mixed-design ANOVA was used to test the hypothesis and is presented in table four. The dependent variables are either the total number of individual innovations per team, the number of group innovations per team or team profitability. The two independent variables (factors) are incentive (manipulation) and period (control). Incentive has two between subject conditions, individual and group compensation. Period is a repeated measures factor with three within subject conditions, being period two, period three and period four. The data was analysed using SPSS statistical software at an alpha level of 0.05. The ANOVA will test whether there is a significant difference in profitability between the two incentive treatments after controlling for period.

<INSERT TABLE 4>

### *Cooperative Innovations*

Table 4 Panel A indicates that the mean number of group innovations is not significantly different, given either an individual or group compensation scheme. In the ANOVA, the incentive variable has an insignificant main effect ( $F=0.081$ ,  $p=0.779$ ). Thus, the incentive structure (individual or group) does not account for the between subject variance in the number of group innovations. As the results are not significant, we are unable to reject H1A.

The control variable period has a significant main effect on profitability ( $F=7.905$ ,  $p=0.004$ ). The mean squares indicate that a substantial amount of within subject variation is due to period in comparison to error, indicating that period has a large effect. There is also a significant interaction between the period and incentive variables in the ANOVA ( $F=3.931$ ,  $p=0.042$ ).

### *Individual Innovations*

Table 4 Panel B indicates that the mean number of innovations is not significantly different, given either an individual or group compensation scheme. In the ANOVA, the incentive variable has an insignificant main effect ( $F=0.000$ ,  $p=0.949$ ). Thus, the incentive structure (individual or group) does not account for the between subject variance in the number of individual innovations. As the results are not significant, we are unable to reject H1B.

The control variable, period, does not have a significant main effect on profitability ( $F=0.200$ ,  $p = 0.820$ ). The mean squares indicate that little within subject variation is due to period in comparison to error, indicating that period has no effect. There is also a significant interaction between the period and incentive variables in the ANOVA ( $F=3.883$ ,  $p =0.029$ ).

### *Profitability*

Table 4 Panel C indicates that the mean profit is significantly greater given an individual compensation scheme than group. In the ANOVA, the incentive variable has a significant main effect ( $F=4.50$ ,  $p=0.05$ ) and the mean square for incentive (162.31) is much higher than the mean square for error (36.07). Thus, in Australia, the incentive structure (individual or group) accounts for a large proportion of the between subject variance in profitability, and this difference is significant. As the above results are significant, we are unable to reject H2.

The control variable period has a significant main effect on profitability ( $F=36.24$ ,  $p = 0.001$ ). The mean squares indicate that a substantial amount of within subject variation is due to period in comparison to error, indicating that period has a large effect. There is also a significant interaction between the period and incentive variables in the ANOVA ( $F=3.36$ ,  $p =0.05$ ).

## **5 Conclusion and Limitations**

The objective for this study was to consider the potential for false choice problems in experimental research. We consider Drake et al's (1999) experiment and entertain the potential for a false choice, reducing the generalizability of their findings. Consideration of possible alternatives to group compensation using the typology developed by Chiang and Birtch (2005; 2006) suggested that individual compensation as a potentially better alternative than a rank order tournament. Our theory development was informed by differences between the conclusions drawn from Drake et al (1999) and the propositions put forward by theories of national culture (given the societal value orientations of Anglo countries) and recent incentive studies (Brown et al, 2008).

We replicate Drake et al's (1999) simulated production task comparing group pooling of profits to an individual profit incentive scheme, instead of tournament. Consistent with the theory development, the results obtained indicate that in an Anglo country setting, workers

perform better given an individual compensation scheme, relative to a group compensation scheme, in a task in an information rich environment without large gains from co-operation, co-ordination and information sharing. This finding is consistent with Brown et al (2008). Further, irrespective of the incentive scheme incentive structure did not have a significant impact on the number of cooperative or individual innovations. These results are consistent with the proposition that national culture impacts behaviour at the organisational level, and given an incentive scheme that is congruent with the prevailing societal values may improve organisational performance.

The results presented are different to those presented in Drake *et al* (1999). This is likely attributable to their assumption that tournament is representative of individualistic compensation. The differences in commendations between the two studies illustrate the problems associated with a false choice bias. Whereas Drake et al (1999) presented evidence that incentive schemes effect the performance of teams, this study presents evidence that given a similar task structure and cultural disposition, individual compensation schemes are to be preferred over group compensation in an information rich environment. Further, this study shows that given Drake et al's (1999) task structure, increased effort, not innovation, is the likely driver of performance. This issue warrants further investigation.

An experimental design was considered to be the most appropriate research method for this study for a number of reasons. First, experiments are able to address important accounting issues for which archival data is unavailable or does not exist, as is the case here (Maines et al, 2006). Second, the high internal and construct validity provided by experiments enables the researcher to isolate complicated concepts and examine their individual and interactive effects (Maines et al, 2006). However, this places a greater burden on the researcher, and thus extreme care must be taken to ensure the experiment is designed and executed in such a way as to preserve this validity. The experiment used in this study is almost identical to that used in Drake et al (1999) and Wynder (2004); therefore the experimental design is less of a concern. However, the practical execution of the experiment if carried out incorrectly has the potential to bias the results.

A limitation of this type of research is the ability to generalise from the sample population of university students to the workforce, which is a recurring issue in experimental research that uses students (Wynder, 2004). However, the external validity sacrifice associated with using

undergraduate university students is “vastly overwhelmed by the strength or power to make causal statements which are brought about by internal validity” (Brownell, 1995 p.15). Another limitation is the bias introduced by the task structure. As the literature suggests, task or organizational structure influences the relative efficiency of group versus individual compensation schemes (Bushman *et al*, 1995; Keating, 1997; Brown *et al*, 2008). Further research manipulating the task structure may address this issue and increase the generalizability of the results. Further limiting this study is that it was replicated in Australia, not in the US. However, there is significant evidence that Australian societal values are similar to those in the US and hence that difference alone can’t explain the difference between the results obtained here and Drake *et al*. (1999).

Future research could take incentives theory one step further and investigate the questions and hypotheses presented here in a cross cultural context by undertaking similar experiments in different countries and by improving the compensation typology. The outcomes of such research may confirm the impact of culture on the relationship between incentive systems and organisational performance.



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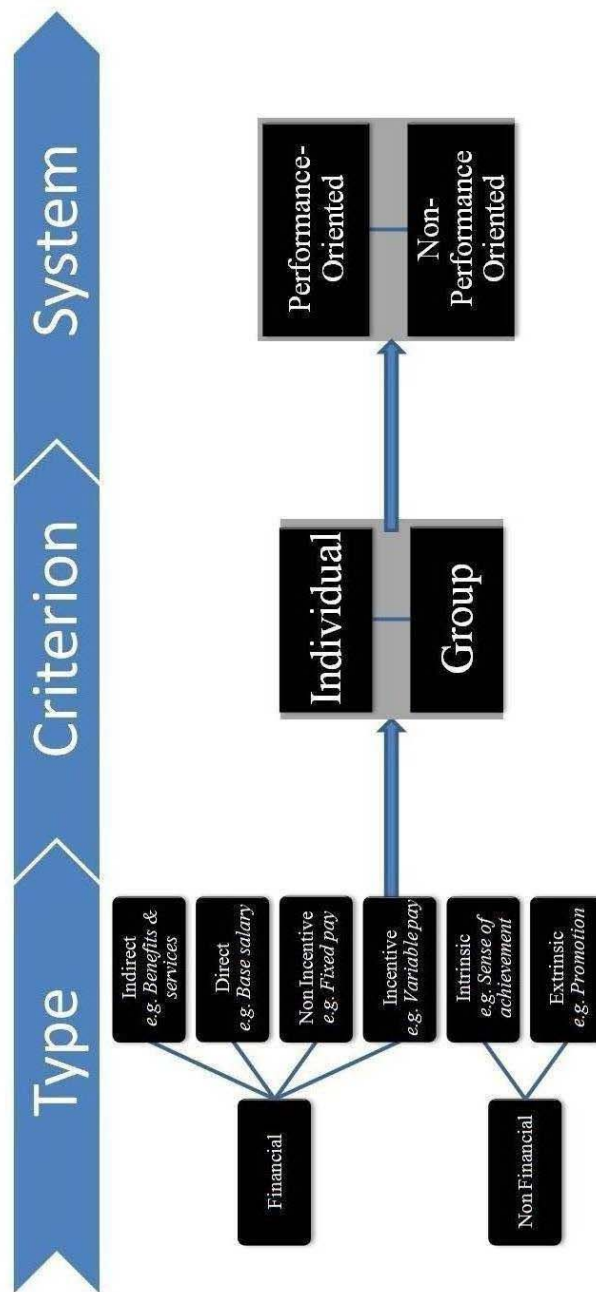
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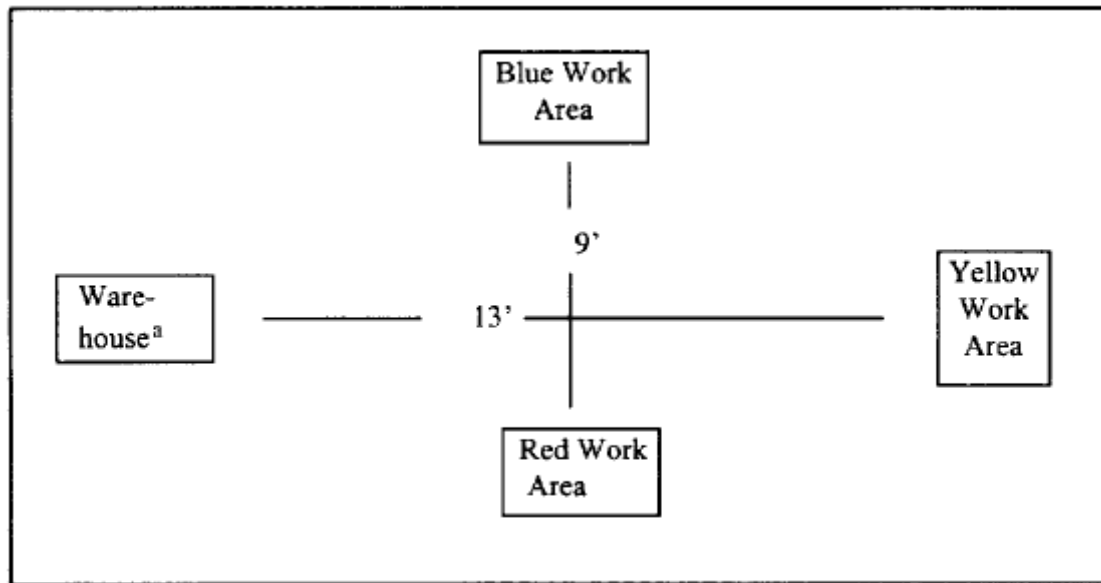
6.0 Tables and Figures

Figure 1 – Compensation Framework<sup>32</sup>



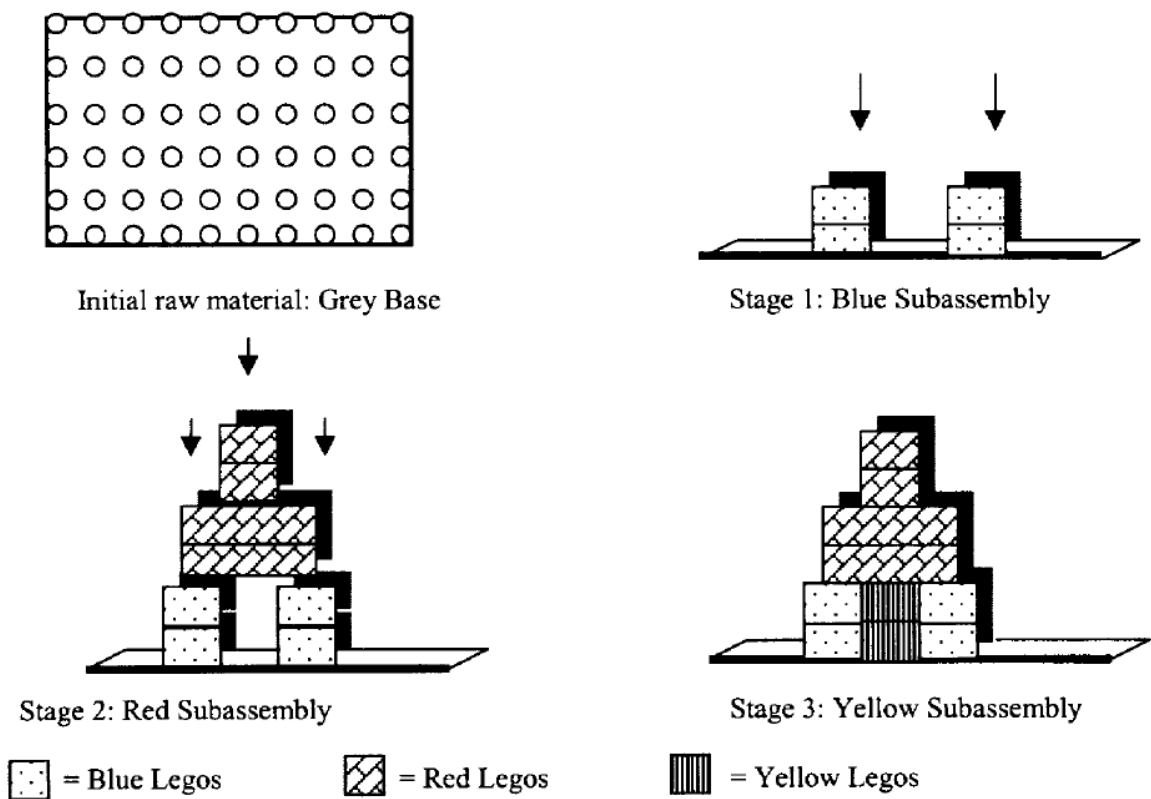
<sup>32</sup> Adapted from Chiang & Birtch's (2005, 2006) type-system-criterion (TSC) framework for rewards.

**Figure 2 – Plant Layout**



*Source: Drake et al (1999 pp. 330)*

**Figure 3 – Assembly Stages**



*Source: Drake et al (1999 pp. 330)*

**Figure 4 – Plant Rules**

1.	You must be the one to <b>first attach blocks</b> of your assigned colour to the product.
2.	To pass quality inspection, colours must be in the <b>correct locations</b> on the product.
3.	Quality inspection occurs only at the end of the production period and the quality inspector <b>cannot answer questions</b> during and between the production periods.
4.	All assembly activities must take place in <b>a designated work area</b> .
5.	You may <b>speak with your co-workers at any time</b> during production or between production periods.
6.	These are the <b>only</b> rules.



**Figure 5 – Compensation Worksheets – Single Period**

*Panel A: Individual Incentive*

	BLUE	RED	YELLOW
<b>REVENUE:</b>			
NUMBER OF ASSEMBLIES COMPLETED	6	4	5
<b>NUMBER OF ASSEMBLIES COMPLETED X \$1.00 = TOTAL REVENUE</b>	<b>\$6.00</b>	<b>\$4.00</b>	<b>\$5.00</b>
<b>COSTS:</b>			
WAREHOUSE STORAGE: \$1.00 PER STORAGE BIN USED	\$1.00	\$1.00	\$1.00
CHARGE PER WORK AREA: \$2.00 PER WORK AREA USED	\$2.00	\$2.00	\$2.00
INVENTORY HOLDING COSTS: \$0.50 PER ASSEMBLY IN PROCESS	\$1.00	\$1.00	\$1.00
<b>TOTAL COSTS</b>	<b>\$4.00</b>	<b>\$4.00</b>	<b>\$4.00</b>
<b>PROFIT:</b>			
PROFIT (TOTAL REVENUES – TOTAL COSTS)	\$2.00	\$0.00	\$1.00
<b>PROFIT = VARIABLE COMPENSATION</b>	<b>\$2.00</b>	<b>\$0.00</b>	<b>\$1.00</b>

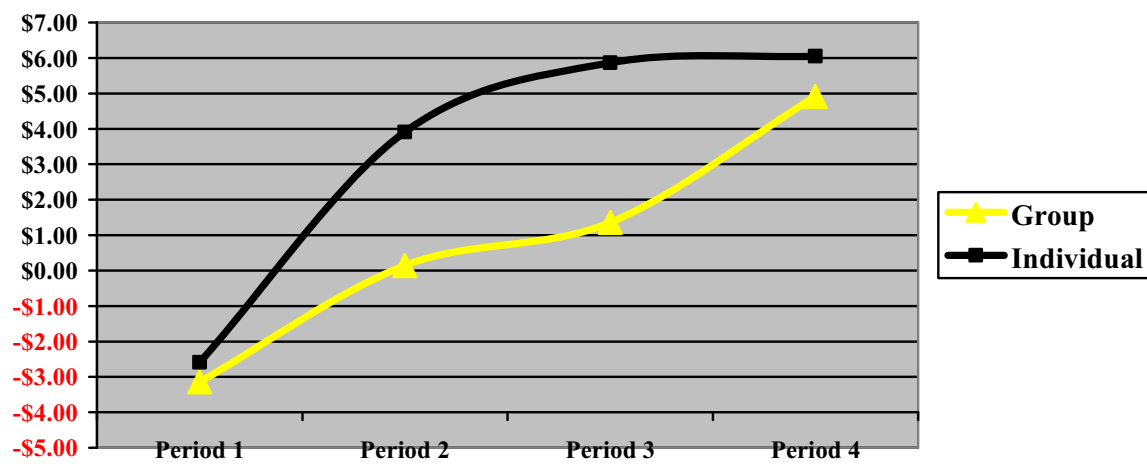
*Note: Assemblers do not receive data pertaining to the performance of the other assemblers. For example, the blue assembler only receives the data in the 'BLUE' column.*

Panel B: Group Incentive

<b>REVENUE:</b>	
NUMBER OF ASSEMBLIES COMPLETED	15
<b>NUMBER OF ASSEMBLIES COMPLETED X \$1.00 = TOTAL REVENUE</b>	<b>\$15.00</b>
<b>COSTS:</b>	
WAREHOUSE STORAGE: \$1.00 PER STORAGE BIN USED	\$3.00
CHARGE PER WORK AREA: \$2.00 PER WORK AREA USED	\$6.00
INVENTORY HOLDING COSTS: \$0.50 PER ASSEMBLY IN PROCESS	\$3.00
<b>TOTAL COSTS</b>	<b>\$12.00</b>
<b>PROFIT:</b>	
PROFIT (TOTAL REVENUES – TOTAL COSTS)	\$3.00
<b>DIVIDED BY 3 = VARIABLE COMPENSATION PER PERSON</b>	<b>\$1.00</b>

*Adapted from Drake et al (1999 pp. 332).*

**Figure 6 – Mean profitability for each treatment group by period**



**Table 1 – Dimensions of Cultural Values Identified by Hofstede<sup>33</sup>**

Cultural dimensions	Cultural dimensions definition
MAS index ( <i>masculinity versus femininity</i> )	<i>Masculinity</i> as a societal value stands for a preference in a society for achievement, heroism, assertiveness, and material success. Its opposite, <i>femininity</i> as a societal value stands for a preference for relationships, modesty, caring for the weak, and quality of life. The fundamental feature addressed by this dimension is the way in which a society allocates social (as opposed to biological) roles to the sexes (Gray, 1988);
UAI index ( <i>strong (high) versus weak (low) uncertainty avoidance</i> )	<i>Uncertainty avoidance</i> is the degree to which members of a society feel uncomfortable with uncertainty and ambiguity. This feeling leads them to beliefs promising certainty and to maintaining institutions protecting conformity. <i>Strong uncertainty avoidance</i> as a societal value stands for the need to maintain rigid codes of belief and behaviour, and intolerance of non-conforming persons and ideas. <i>Weak uncertainty avoidance</i> as a societal value stands for a need to maintain a more relaxed atmosphere in which practice counts more than principles and deviance is tolerated. The fundamental feature addressed by this dimension is how a society reacts to the uncertainty of future events whether it tries to influence the future or passively let it happen (Gray, 1988).
PDI index ( <i>large (high) versus small (low) power distance</i> )	<i>Power distance</i> is the extent to which members of a society accept that power in institutions and organisations is distributed unequally. <i>Large power distance</i> as a societal value is indicative of individuals accepting a hierarchical order in which everybody has a place which needs no further justification. <i>Small power distance</i> as a societal value is indicative of striving for power equalisation and demand justification for power inequalities. The fundamental feature addressed by this dimension is how a society treats inequalities among people when they occur (Gray, 1988).
<i>individualism versus collectivism</i> (IDV index);	<i>Individualism</i> as a societal value is indicative of a loosely knit social fabric; individuals are expected to take care of themselves and their immediate families only. Its opposite, <i>collectivism</i> as a societal value is indicative of a preference for a tightly knit social fabric in which individuals expect their relatives, clan, or other in-group members to look after them in return for unquestioning loyalty. The fundamental feature addressed by this dimension is the degree of interdependence a society maintains among individuals. It relates to people's self-concept: "I" or "we" (Gray, 1988).

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<sup>33</sup> Based on Hofstede (1980)

**Table 2 – Sample Characteristics**

	<b>Australia</b>
Number of subjects	66
Number of teams	22
Average age in years <sup>34</sup>	19.86
Gender – male (female)	41% (59%)
Experience working in a team	
- Paid employment	82%
- Educational	89%

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<sup>34</sup> One student group did not provide a response to this question.

**Table 3 – Descriptive Statistics**

*Panel A: Mean level of cooperative innovations each period <sup>a</sup>*

	Period 1	Period 2	Period 3	Period 4	MEAN*
Group	0.64	0.82	2.82	3.00	2.21
Individual	0.45	1.73	2.09	2.09	1.97

*Panel B: Mean level of individual innovations each period <sup>b</sup>*

	Period 1	Period 2	Period 3	Period 4	MEAN*
Group	7.64	10.82	9.55	9.64	10.00
Individual	7.27	9.45	10.45	10.09	10.00

*Panel C: Mean level of profit each period <sup>c</sup>*

	Period 1	Period 2	Period 3	Period 4	MEAN*
Group	-\$3.14	\$0.14	\$1.36	\$4.91	2.14
Individual	-\$2.59	\$3.91	\$5.86	\$6.05	5.27

*Panel D: Descriptive Statistics – by team and period*

	Group	Individual
<b>Number of teams</b>	11	11
<b>Number of periods</b>	3	3
<b>Number of team periods</b>	33	33
<b>Mean</b>	\$2.14	\$5.27
<b>Median</b>	\$2.00	\$4.50
<b>Minimum</b>	-\$7.00	\$0.50
<b>Maximum</b>	\$12.50	\$13.00
<b>Standard Deviation</b>	\$4.57	\$3.64

<sup>a</sup> Cooperative Innovations are measured by counting the number of innovations instigated in the period where at least two participants were required to cooperate for the innovation. The number represents the total number of different types of group innovation per group, per period.

<sup>b</sup> Individual Innovations are measured by counting the number of innovations instigated in the period for each participant. Individual innovations did not require to cooperation between participants. The number represents the total number of individual innovations (the sum of all group members), per group, per period.

<sup>c</sup> Profitability is total revenue less total expense for each group divided by the number of participants.

**Table 4 –Two-Factor Mixed Design ANOVA <sup>a</sup>**Panel A Cooperative Innovations <sup>b</sup>:

Source of Variation	Type III Sum of Squares	df	Mean Square	F	Sig.
Between Subjects					
<i>Incentive</i> <sup>c</sup>	0.970	1	0.970	0.081	0.779
Error	239.152	20	11.958		
Within Subjects <sup>d</sup>					
<i>Period</i> <sup>e</sup>	22.182	1.49	14.889	7.905	0.004
<i>Period * Incentive</i>	11.030	1.49	7.404	3.931	0.042
Error	56.121	29.796	1.884		

Panel B Individual Innovations <sup>f</sup>:

Source of Variation	Type III Sum of Squares	df	Mean Square	F	Sig.
Between Subjects					
<i>Incentive</i> <sup>c</sup>	0.000	1	0.000	0.000	0.949
Error	351.333	20	17.567		
Within Subjects <sup>g</sup>					
<i>Period</i> <sup>e</sup>	0.818	2	0.409	0.200	0.820
<i>Period * Incentive</i>	15.909	2	7.955	3.883	0.029
Error	81.939	40	2.048		

Panel C Profitability <sup>h</sup>:

Source of Variation	Type III Sum of Squares	df	Mean Square	F	Sig.
Between Subjects					
<i>Incentive</i> <sup>c</sup>	162.307	1	162.307	4.500	0.047
Error	721.349	20	36.067		
Within Subjects <sup>g</sup>					
<i>Period</i> <sup>e</sup>	131.546	2	65.773	12.844	0.001
<i>Period * Incentive</i>	34.455	2	17.227	3.364	0.047
Error	204.833	40	5.121		

<sup>a</sup> This ANOVA is based on 66 observations, being of 22 groups for 3 periods. The model is a two factor mixed design model. The two factors are incentive (group versus individual compensation) and period (being periods 2, 3 and 4). As the dependent variable is measured over a number of periods, a repeated measure design is used.

<sup>b</sup> Cooperative Innovations are measured by counting the number of innovations instigated in the period where at least two participants were required to cooperate for the innovation. The number represents the total number of different types of group innovation per group, per period.

<sup>c</sup> Incentive: the between-subject variation between the treatment groups given an individual incentive structure and those given a group incentive structure.

<sup>d</sup> The results from Mauchly's Test of Sphericity indicated that we must reject the assumption of sphericity of the data (p. 0.019). Therefore Within subject effects are reported after making the Greenhouse-Geisser correction. The results remain the same under the Sphericity Assumed and Huynh-Feldt correction models.

<sup>e</sup> Period: the within-subject variation between periods 2, 3 and 4.

<sup>f</sup> Individual Innovations are measured by counting the number of innovations instigated in the period for each participant. Individual innovations did not require to cooperation between participants. The number represents the total number of individual innovations (the sum of all group members), per group, per period.

<sup>g</sup> The results from Mauchly's Test of Sphericity indicated that the assumption of sphericity of the data cannot be rejected (Panel B Individual innovations model, p. 0.676; Panel C Performance model, p. 0.289).

<sup>h</sup> Profitability is total revenue less total expense for each group divided by the number of participants.