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Task-Oriented Groups: A Motivational and
Confidence Approach to Effective Decision Making

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Abstract

This study investigates two components of effective individual vs. group decision making: motivation/effort and confidence. Motivation/effort refers to a resource allocation process in which commitment in the form of time and energy is distributed across competing acts. Confidence is the subjective evaluation of an individual or group's decision quality. A manipulation check shows that the presence of distracters has an effect on effort, subjects showed less effort with distracters and more effort without distracters. Effort, in turn, affected confidence. Results indicate that people who put forth more effort toward a task are more confident about their judgments than people who put forth less effort toward the same task. There are indications that groups were more confident than individuals, but these results are marginally significant. Contrary to past studies, there is no evidence showing that effort and confidence affected accuracy. Implications for the role of distracters in motivation/effort and for the link between motivation/effort and confidence are discussed.

Task-Oriented Groups: A Motivational and Confidence Approach
To Effective Decision-Making

Groups: An Introduction

All living things survive collectively; our natural habitat
is one example. There are a countless number of species where
one member cannot survive without the cooperation from its
other members. Goldfish in large numbers are better able to
resist poisons in their habitat than is the lonesome one. A
herd of deer can more readily cope with deep snow than can the
individual member, and a flock of birds can survive where a
single member of the species cannot. Mutual assistance by
members of the same species is only one aspect of the process
by which living things achieve collective survival. There are
also times where cooperation by members of different species
is fairly common. For example, it is very ordinary to witness a
kind of parasite that lives jointly with its host in order for it
to survive.

With these examples in mind, it is important to realize
that humans are no exception to the rule. Biologically
speaking, it is obvious that humans cannot exist in this world
without having another mate for reproduction. However, in the
minds of social scientists, human's approach to collective
action can be far more flexible. Humans can more easily

change their behaviors to meet the constant demands of their environment, and can abandon one choice of action in favor for another that is considered more appropriate. Yet this decision-making process is much more complicated than it first appears, even contradictory at times. Consider, for example, the following pairs of adages offered by Steiner (1972).

Two heads are better than one, but

Too many cooks spoil the broth.

The more the merrier, but

Three is a crowd.

If you would have a thing well done, do it yourself, but,

Jack of all trades, master of none.

In unity there is strength, but

A chain is no stronger than its weakest link.

These various (and conflicting) propositions reveal our society's long interest in the question of whether people work harder, think more clearly, learn more effectively and are more creative in the company of others or on their own (Brown, 1988). They demonstrate that our experiences give us lessons concerning the nature and consequences of collective behavior. Thus, the study of how individuals work together in deciding when collective behavior would be most productive is a beginning to understanding the group interaction process.

There has been a long history of the study of the individual. Theories after theories have aimed to comprehend how the individual thinks and behaves in certain situations. Scientists have observed and tested attitudes, decision-making, self-evaluation, and other dependent variables on the individual level. These are important and valuable contributions to the behavioral science line of research, but what needs to be addressed is how these individual members can collectively work together in order to become a productive, unified entity.

When you look around you, groups exist everywhere. Team sports such as football and basketball work together for the goal of winning, jurors have to decide on a verdict as a whole, and there are also parents' club committees who decide what policies are best for their children. Families are groups in which we live and eat together, and even a group of individuals trying to win a tug-of-war battle work collectively to achieve some sort of group objective. The American governmental system is a group decision making body in itself. In addition, much of the world's business takes place in groups. Top executives and the managerial teams constantly make vital decisions as a group everyday. Thus, even a short list like this proves to show why the research on groups is constantly increasing each year.

Researchers realize that groups are very important because they are the stepping-stones through which much work gets done. According to McGrath, groups are instruments for influencing, shaping, and changing the individuals who are their members (1984). So, interest in learning about groups is a natural consequence of how essential they are in our everyday world.

The main focus of this paper is the discussion of past studies about group processes. Specifically, I will examine empirical literature dealing with the processes and productivity of task-oriented groups. In the first part, groups will be defined by looking at the various components which make a group. There will also be a discussion on the various tasks which different groups perform and how they affect the network of group performance. Second, after a group knows the specific type of task it must perform, the individual members of the group must then decide how they should allocate their time and effort to the group task. Thus, motivation will be examined by referring to different aspects of this group phenomenon (e.g., social dilemmas, social loafing, goal-setting). Third, we will examine non-motivational factors that affect group decision-making effectiveness (e.g., social influence). The final section of this paper will examine how groups evaluate their judgments and choices and see how

they form their opinions on the success of these judgments and choices. These beliefs about the value of the individual's judgments are considered in light of their confidence. Finally, the confidence literature will be examined because we will want to see how the entire group process affects of confidence and in turn, how confidence influences the course of action the individual and group selects in subsequent tasks.

Definition Of A Group

What is a group? Collective action can involve as few as two persons or as many as a million or more. According to Davis (1969), it is commonly observed that group behavior is a function of three classes of variables: (a) person variables, such as abilities, personality traits, or motives (b) environmental variables that reflect the effects of the immediate location and larger organization, community, or social context in which group action takes place; and (c) variables associated with the immediate task or goal that the group is pursuing. Many researchers have attempted to classify groups by emphasizing one or the other of these three variables. For example, Jennings (1950) said that groups composed of persons who have sought and maintained membership primarily because they are interested in the goals of the group are called socio-groups. Groups who have members that are in the group because they are somehow

attracted to one another are called psyche-groups. In addition to group goals, other researchers have defined group in terms of one or more of the following characteristics: motivation, group organization, and interdependency. In terms of motivation, Locke (1991) for example, identified groups as moving through a sequence of seven key motivational concepts (needs, values, goals, expectancy and self-efficacy, performance, rewards, and satisfaction). In terms of group organization, McDavid and Harari (1968) define the group as an organized system of two or more individuals who are interrelated so that the system performs some function, has a standard set of role relationships among its members, and has a set of norms that regulate the function of the group and each of its members. In terms of interdependency, Fiedler (1967) perceives the group as a set of individuals who share a common fate, that is, who are interdependent in the sense that an event which affects one member is likely to affect all. It appears that different theorists look at different aspects of the group. However, there is sufficient commonality among these definitions to show that they are all referring to the same basic concept: the group.

For our purposes, we will use Jennings' (1950) definition of socio-groups in which the individual members are willing to achieve some sort of common objective (e.g.,. completion of a

certain task or producing a high quality product). This paper will also touch upon those aspects that were used to define the group discussed above. Now that we essentially know what constitutes a group, we can proceed to see how groups interact with one another and how each individual member influences the group and/or its other members and in turn, how the group itself influences each person in it.

Types Of Tasks

A group forms and maintains its existence for some kind of purpose. When this purpose ceases to exist, the group is likely to break apart and vanish unless the group finds another purpose. Of course there can be more than one purpose or in other words, groups can have more than one goal. Group goals are sometimes referred as group tasks. According to Shaw (1971), tasks and goals are two separate yet related elements. The task faced by the group is intimately related to the group goal; to the extent that task completion will move the group toward its goal, the group members will be motivated to work toward task completion. The task, therefore, is what must be done in order for the group to achieve its goal or subgoal (Shaw, 1971).

There is no relevance in pursuing how groups perform together without knowing the type of task they must perform. A group of military men in combat definitely have a different

task than a managerial team of a large corporation actively deciding on a merging offer. The former deals with the concept of winning while the latter demands a negotiable decision. For this reason, it is essential to classify tasks in order for us to know what processes are involved in what type of tasks. There are a number of different tasks and researchers have attempted to classify them in various categories. To take a couple, Steiner (1972) divided tasks into five categories to distinguish between divisible and unitary tasks: unitary, divisible, conjunctive, disjunctive, and additive. Shaw (1973), on the other hand, proposed six dimensions along which group tasks varied: intellectual versus manipulative, task difficulty, intrinsic interest, population familiarity, solution multiplicity versus specificity, and cooperation requirements.

McGrath's (1984) recent book provides the best overall summary of the current status of the group performance literature. He proposes a model of task types in his "group task circumplex" model. This model asserts that groups can do four things: generate ideas or plans, choose among alternatives, negotiate conflicts, and execute activities. This framework is diagrammed in Figure 1.

Insert Figure 1 about here

McGrath (1984) claims that the rationale behind this model was based upon the past work of Shaw, Carter, Hackman, Steiner, Shiflett, Taylor, Lorge, Davis, Laughlin, and their colleagues. As McGrath recounts, early distinctions among group tasks were relatively straightforward, such as distinctions between intellectual and motor tasks and between simple and complex tasks. As time passed, distinctions became more detailed and varied. This is the reason many researchers attempted yet somewhat failed to successfully classify all types of tasks. McGrath then attempted to combine these researcher's systems into one integrated scheme. Guzzo (1986) agrees that McGrath's Circumplex Model provides an excellent overview of theory and research on group tasks. He feels that McGrath adequately distilled just the important organizing principles from a lengthy list of descriptions of group tasks. He suggested that there are two basic dimensions of group tasks that underlie those existing descriptions. Guzzo (1986) provides a brief and accurate description of these two dimensions. One dimension is the presence of conceptual, as opposed to behavorial, demands of tasks, or "thinking" as opposed to "doing." The second

dimension is the degree . which a task induces conflict as opposed to cooperation among group members. From this, McGrath braaks these two dimensions into eight types and used these types to review and discuss results of research on group performance.

Goodman (1986) also agrees that McGrath provided a good classification system since it has been found that the more general schemes (for example, McGrath) seem helpful in organizing knowledge about groups. Instead of classifying groups into mutually exclusive task categories, the scheme would be used to classify activities within a work group. Another reason why he favors this scheme is that it provides a way to organize knowledge about what we already know about groups. He also mentions that the task taxonomy serves another function: to serve as a moderator variable (Goodman, 1986). In other words, groups differ in terms of their tasks. As we change input characteristics of groups, such as size, we should expect differences in performance as a function of task characteristics.

Although many researchers unanimously agree that McGrath's Group Task Circumplex provides the best and most representable framework for classifying tasks, they also mention a couple drawbacks and considerations (Goodman, 1986; Guzzo, 1986; Cummings, 1986). For example, Guzzo

(1986) believes that McGrath's account is an accurate portrayal of the existing descriptions of group tasks but it does not adequately describe group tasks as they occur in organizations: the predominant research method has been laboratory investigation. He believes that this method of investigation limits the nature of tasks open to investigation, such as restricting tasks to those of short duration, comparatively low complexity, and one-shot as opposed to cyclical performance requirements (Guzzo, 1986). In other words, Guzzo feels that categorization of tasks derived from laboratory studies are not fully applicable as descriptions of groups tasks in organizations because of there is a much more variety of tasks in a real organizational settings.

I think that Guzzo's comment about McGrath's model being ungeneralizable is not true. Of course there are limitations to laboratory experiments, yet there are also drawbacks on research methods conducted in natural settings. I believe that the Circumplex Model *does* indeed apply to group tasks in organizational settings. Guzzo is correct by stating there are a wide variety of tasks in work groups, however, all these task types do fall in the model. The number of different types of tasks does not have an affect of whether they can fit into one category or another. Doesn't everyone in the entire

world, with all of them having unique characteristics of their own, fall into two basic groups: male or female?

For all the previous reasons, I am going to follow McGrath's model to clarify the type of task we will address. Since it has been repeatedly argued that the nature of the task is a critical variable in determining group effectiveness, immediately deciding what type of task is crucial in setting the foundation for this paper.

Determining how a company would like to present its image, crisis management, how to achieve and maintain employee morale, choosing whether or not to merge with another company, and determining a corporation's budget are only a few of the many decisions a work group must negotiate upon within an organizational setting. Where would these types of decisions be placed under within McGrath's model?

The closest match for these kinds of decisions are found in the second quadrant, Choose. Out of the eight task types that McGrath (1984) offers, we will be concentrating only on the subtype Decision-Making category. According to the the Circumplex Model, decision-making tasks are tasks that demand consensus. The correct answers are found by having the group come to a mutually acceptable decision. These tasks differ from the Intellective tasks by not having correct answers based on expert consensus, cultural norms, or on logic

and broadly known facts. Specifically, McGrath (1984) further defines the Decision-Making tasks:

> A similar but less clearly distinctive set of subtypes can be distinguished within the Decision-Making category...the "correct" right or what is to be preferred. For some of these, answers draw on cultural values, presumably broadly shared in the population from other social influence processes operating among the particular individuals who are the group's members. Still others may involve consensus attained by sharing relevant information (p.79;

It is fairly obvious that, for example, deciding whether a company should merge with another does not have a correct answer. No one will know if the final decision is correct or not until they have actually follow up on their decision and evaluate it. McGrath (1984) also claims that there are three advantages of these "no right answer" decision tasks over individual tasks: (1) by sheer numbers, they are more likely to have a broader range of skills and knowledge pertaining to a task, (2) a group provides the opportunity for an effective division of labor because the total amount of information to be acquired and processed may be vast, and (3) decisions reached by a group are more likely to be regarded legitimate than decisions reached by individuals. For our purposes then, we

will be referring to decision-making tasks throughout this paper. Establishing a specific type of task is the persistent thread that will determine how we should investigate the group process in the organizational setting. After a group realizes the specific decision-making task they must resolve, they would then need to decide how they should individually allocate their resources, in other words, decide how they choose to allocate their time and effor' The next section will address this issue.

Social Dilemmas

People make numerous decisions all the time, knowingly or unknowingly. It is not surprising to know that the topic of decision making is shared by many disciplines, including statistics, economics, political science, sociology, and psychology. Choosing what action to do as in how much effort an individual is willing to put forth in the group task is a dynamic process in which the individual continually evaluates. In other words, there seems dilemma between a person's self-interest and the group interest. This is often labeled as a social dilemma.

But how are social dilemmas defined? According to Dawes (1980), social dilemmas are defined by two simple properties: (a) each individual receives a higher payoff for a socially defecting choice (e.g. having additional children, using

all the energy available, polluting his or her neighbors) than for a socially cooperative choice, no matter what the other individuals in society do, but (b) all individuals are better off if all cooperate than if all defect. Similarly, Brewer and Kramer (1986) believe that social dilemmas appear in two basic forms: the public goods problem (in which the individual must decide whether to contribute to a common resource) and the commons dilemma (in which the individual must decide whether to take from a common resource). However, they later argue that the commons dilemma and public goods problem can be viewed as logically equivalent because of this rationale: To the extent that individuals are concerned primarily with the *net* outcomes of their actions, it should make no difference in structural terms whether their decision entails not taking from a common resource or contributing towards its provision, so long as the end result is the same (Brewer and Kramer, 1986). I agree with their reasoning because in both cases, individuals are considering the possible consequences of their contribution or acceptance to or from the collective good.

Now that we have established an understanding of what a social dilemma entails, we need to know how this affects the individual's judgments and choices in group decision-making. This would involve having the individual make a choice in allocating his or her resources; choosing how to distribute his

or her effort into the group task. This may be determined by evaluating the content of some articles and reviewing results of studies involving social dilemmas.

On the individual level, it has been found by Brewer and Kramer (1986) that social identity, group size, and decision framing effect the choice behavior in social dilemmas. Decision framing is also important in the Prospect Theory (Kahneman and Tversky, 1983). In general, a preference for a sure outcome over a gamble that has a higher or equal expectation is called risk averse. The rejection of a sure thing in favor of a gamble of lower or equal expectation is called risk seeking. In short, it has been found that gains entail risk aversion and losses entails risk seeking. The point here is that there are variables that affect a person's choice in distributing their effort. Effort toward a task is a crucial element for having high quality results. But what, in turn, affects effort? Another way of putting it, when and why does a person working in a group have a different level of task motivation or effort than when working alone?

To make explanations easier, I will begin by proposing a simple social dilemma scenario: Assume that John and two other co-workers, Tom and Stephanie were assigned to develop a campaign for a new account. They all come from different departments of the advertising agency: John is a expert in the

creative department. Tom works in the research department, and Stephanie is in the media department. Thus, all members must contribute his or her expertise in order for the group to achieve a successful campaign. There are three other similar groups that were assigned the same task. At the same time, all individual workers have their own projects to complete in their own departments. After a two week deadline, all four groups will present their campaign in front of a board. The "best" campaign will be used for the account and all the members of that group will receive a substantial pay raise.

First of all, this is an example of a social dilemma since the pursuit of self-interest can lead to failure to successfully complete the group project. If either John, Tom, or Stephanie decides not to do his or her part in the group assignment, the group task will then become a failure since each person's input is crucial. If one of them acts upon self-interest, as in having their individual tasks in their own departments being a higher priority, the group as a whole will not perform optimally. By definition this would end in a collective disaster.

There are two mechanisms that underlie social dilemmas: the free-rider effect and the sucker effect. The free-rider effect is defined as a situation in which there is a possibility of some other member of a group that can and will provide a public good, making one's own contribution

unnecessary. Kerr (1983) provides an example of the free-rider effect: in combat, soldiers in their foxholes may reason that someone else wil to lead the charge against the enemy, so there's little need for them to do so. This reasoning encourages them to stay in their foxholes and become what Olson (1965) called free riders. The other motivational loss was introduced by Dawes and Orbell (1981) labeled the sucker role. According to them, the sucker effect occurs when others in the group may profit as a result of your contributions without themselves contributing; the member who carries free riders is called the "sucker." Nobody likes to play the role of the sucker thus, they may end up not contributing to the group at all. To go back on the combat example, the soldiers in their foxholes may reason that if they fight, they may end up being killed for the benefit of those who would not fight; to avoid this outcome, they may simply choose not to fight (Kerr, 1983). If all members have either the free-rider effect or the sucker effect, it would inevitably end, by definition of a social dilemma, in a collective disaster. Together, the sucker and free-rider effects illustrate how complicated many social dilemmas can be.

Yet, how can one reduce the chances of having a collective disaster? One way is to offer an incentive. For example, Orbell and Dawes (1981) suggest that as long as

people are selfishly motivated, there is no other way to avoid the collective disaster except to alter individual incentives so that the situation is no longer a social dilemma. There are many ways to do this: coercion (e.g., fines for those people who do not contribute or even receiving social disapproval), selective rewards (e.g., various monetary amounts), and having the opportunity to communicate has also been shown to increase cooperative behavior. But the question still remains: how do social dilemmas lead to collective disaster?

Guzzo (1986) suggests that there are five major determinants of effective group decision making: the task, rewards, resources, autonomy, and having appropriate performance strategies. Group A's task is to complete a well-prepared campaign by the deadline required. We have already discussed the importance of tasks earlier, so now we will turn to the motivational aspects in which the rewards and resources apply to the social dilemma presented. To recall the underlying question again, why would one or more members in a group decide to put forth different levels of effort or motivation toward the group task? Or in other words, why would there be a substantial amount of motivational loss in certain group tasks, or in particular, in decision-making tasks?

Social Loafing

There have been numerous studies measuring group performance that have found that people exert less effort in a variety of tasks when they work collectively, in comparison with when they work individually; this is a phenomenon labeled social loafing. Social loafing has been studied under many conditions by different theorists: social loafing on difficult tasks vs. simple tasks (Jackson and Williams, 1985), the effects of having an incentive (Shepperd and Wright, 1989), as being a complement of social facilitation (Harkins, 1986), the role of evaluation in eliminating social loafing (Harkins and Jackson, 1985), as a consequence of the type of task (Latane, 1986), and so forth. The understanding of the cause and effects of social loafing is very important in trying to comprehend how people choose to distribute their time and effort.

Social loafing is in essence a diffusion of responsibility. According to this idea, individuals are less likely to behave responsibly if the responsibility is shared. The diffusion of responsibility can be understood within the larger context of Latane's (1981) theory of social impact, which deals with how an individual's physiological states, subjective feelings, motives, emotions, cognitions, beliefs, values, and behavior are affected by the presence or actions of other people in his

or her environment. In many work settings, one or more employees are pressured to work hard from management or their supervisors. According to the social impact theory, it should be expected that responsibility will be diffused throughout the group and each individual will exert less effort than he or she would if alone (Latane, 1986).

But what leads individuals to loaf? Latane (1986) gives three possible explanations. One possibility is that people have learned from their previous group involvement that other people are likely to avoid work, therefore, they would decrease their own effort in groups in order to maintain equity. However, this has been proven incorrect because it has been found that individuals overwhelmingly predict that others will try harder in groups (Latane, 1986). The second explanation says that people would want to conserve their efforts until they were are required to do an individual task. This also has been proven wrong by an experiment conducted by Harkins, Latane, and Williams (1980). The last possibility is that by decreasing their input while exhorting others to increase theirs, individuals can increase their relative reward/cost ratio (Latane, 1986). This explanation has been supported from an experiment done by Williams, Harkings, and Latane (1980) in which participants were led to believe that their relative contributions could be individually identified, almost

eliminating the social loafing effect. In any case, such a phenomenon does exist and much has yet to be learned about social loafing in organizations.

There have been several lines of research which search for a way to eliminate or reduce the chances of social loafing effect. Such a study was done by Jackson and Williams (1985). They manipulated group task difficulty. They have found that working collectively enhanced performance on easy tasks, whereas those working co-actively performed better on simple tasks and worse on complex tasks (Jackson and Williams, 1985). Another study manipulated the incentive component (Shepperd and Wright, 1989). They found that social loafing occurred when subjects worked as part of a group, but only when an incentive was not provided. These remedies among others have proven to significantly reduce the probability of social loafing. However in my opinion motivational loss, such as the social loafing effect, cannot only be eliminated through the manipulation of one, two or three variables (for example, Harkins & Jackson, 1985; Jackson & Williams, 1985; Shepperd & Wright, 1989). I believe that there are many interacting variables which affect a person's motivation or effort on an individual task and more importantly, on a group task. Fatigue, boredom, length of task, priority, and other extraneous variables may affect motivational loss. There is empirical

evidence that addresses these variables but we will not discuss them in the present paper. However, it is imperative that further research investigating other possible explanations of the social loafing effect should be done.

In general, social loafing is associated with negative connotations. As Latane et al. (1979) stated, "We must confess that we think social loafing can be regarded as a kind of social disease that has negative consequences for individuals, social institutions, and societies" (p. 831). However, Jackson and Williams (1985) believe that social loafing may not always be a bad thing. In fact, social loafing has been shown to enhance performance by reducing stress in individuals working collectively on difficult tasks. In addition, one can point out that trying less hard (social loafing) may improve performance in certain circumstances. Latane (1986) also believes that social loafing may be beneficial from a group's perspective:

> Although loafing would seem to have primarily negative
> effects on short-term productivity, it is possible that
> its individual or long-range effects are more positive.
> Although the lack of individual recognition and control
> may lead people to dislike collective tasks, if people
> prefer work settings that allow for the sharing of
> responsibility, this potential may attract them to group
> tasks. It is therefore important to discover whether

social loafing can be eliminated only at the expense of individual satisfaction and enjoyment of the task (p. 302).

Motivational loss effects are not a reason alone to reject group tasks altogether. So far, we have seen where groups may produce more harm than good, yet groups make it possible to achieve many goals that individuals alone could not possibly accomplish. When the presence of others does help a group task, it is called social facilitation. As Harkings (1987) summarizes it, "The *usual* finding in social facilitation research is that working together leads to enhanced performance on simple tasks and debilitated performance on complex ones" (p.4). Furthermore, he argues in his article that social loafing and social facilitation are closely related; actually, he believes that these two paradigms are in fact complementary. Specifically, this is the reason Harkins (1987) gives:

> In social facilitation research, when participants coact, their outputs can be compared and they work harder than participants working alone. In social loafing research, when participants coact, their outputs cannot be evaluated, and they put out less effort than participants whose outputs can working together enhances evaluation

potential; in social loafing, working together reduces it (p15).

In this case, these findings could be attributed to the effect of evaluation. It really depends on a lot of things whether groups can perform better than the individual (e.g., the opportunity to evaluate, the difficulty of the task, reward or incentives, and so on). For the most part, it is logical to believe that groups and organizations do perform better than individuals, and most of us spend most of our lives in them. To iterate, collective action is a vital aspect of our lives (Latane, 1986).

Social Dilemmas Vs. Social Loafing

When comparing social dilemmas and social loafing, one can see some similarities and differences between the phenomena. One difference between them is their definitions: social dilemmas are situations in which the rational pursuit of self-interest can lead to collective disaster (Kerr, 1983). The behaviors in social dilemmas are then applied to the concept of social loafing or more simply, motivational loss for an individual. Another difference is that social dilemmas have both the actions of contributing and receiving as choices an individual can choose to do. In contrast, social loafing is only concerned with a member's lack of contribution in a group. There are also a number of similarities between these concepts. First, both rely on the interdependence of group

members. In each case, members depend on the other members
to some degree. If there is an overestimation of other
members' effort, it tempts an individual to contribute less.
The end result may lead to a collective disaster (social
dilemmas) or to a less than optimal outcome (social loafing).
Second, there exists an unequal distribution of effort among
the individuals within the group. Lastly, both refer to an
aspect of motivation where individuals must allocate their
time and effort toward a collective action. Remember, it is
the motivational loss (e.g., social loafing) that leads to a
potential collective disaster (e.g., social dilemma).

It is often assumed that social dilemmas and social
loafing present a conflict, usually between what the individual
wants for him or herself and how much he or she is willing to
give toward the collective good. Yet there may times where
they do not necessarily pose any conflict. For example, there
could be a clear set of priorities that an individual can have
where the distribution of .iis or her time and effort is put
forth in a certain event over another no matter what the
consequences are. Or there could also be a negotiated
agreement between the members of the group about how much
they will each contribute. Sometimes the members are not
aware that these phenomena are occurring; this is often the

case with social loafing (Latane, 1986). Therefore, an awareness of a conflict would also not be known.

Social dilemmas and social loafing are intriguing group phenomena which contribute to the understanding of group motivation. They help us gain deeper knowledge on how members might distribute their resources toward a group task, which in turn affects how hard they might work together. But more importantly, they demonstrate that the amount of an individual's work *is dependent* on the other members' work when realizing a collective goal.

So far in this paper we have focused on (1) what constitutes a group and why studying groups is important in our lives, especially in organizational settings (2) the typology of tasks was discussed and McGrath's (1984) Circumplex Model was specifically analyzed to build the foundation for the purpose of a collective action, (3) a motivational loss (social loafing effect) in social dilemma situations (for example, Jackson & Williams, 1985; Latane, 1986; Orbell & Davis, 1981; Olson, 1965; Shepperd & Wright, 1989), (4) compared and contrasted social loafing and social dilemmas, and lastly (5) social facilitation and social loafing were discussed together to suggest that they may complemen' each other in the same design (Harkins, 1987).

Now that we have discussed why there may be some motivational loss in group tasks, we shall identify the elements which actually enhance group performance by motivating members to work effectively together. More specifically, we want to know what variables affect commitment toward a group task. We would then question how and where social influence comes into play when members of the group are deciding on a decision-making task. But first, we must consider various theories about motivation.

Motivation And Commitment

What is motivation? We have previously explained some conditions in which people experience motivational loss in social dilemmas without exactly defining what motivation is. For our purposes, we will be using the definition Naylor, Pritchard and Ilgen (1980) proposed: motivation is defined as the process of allocating personal resources in the form of time and energy to various acts in such a way that the anticipated affect resulting from these acts is maximized. They also distinguished motivation and effort saying that changing motivation is essentially changing the *direction* of behavior, not amplitude (effort). This is different from what most theorists say; most theories imply that by increasing motivation, you increase effort on the task (Guzzo, 1986). The rationale behind Naylor et al. (1980) view is as follows:

While it may be true that *in a given time interval* the person has exerted more effort to task relevant acts, our (Naylor, Pritchard, and Ilgen) position is that the overall level of time and effort commitment has not changed, but that the commitment has been reallocated in a more task-efficient manner (p. 164).

Although this may be a logical explanation the group decision tasks we are focusing upon in this paper, as defined earlier, are limited to occur at a given time interval. For our purposes then, we will refer to motivation and effort as the same concept.

Why should we study motivation? Guzzo (1986) gives a logical explanation as to why we should study group motivation as opposed to studying information processing or social interaction (which past theories related to group decision making focused on). He believes that since motivation is frequently cited to be an important factor in determining performance, then it should also be an important determinant for group decision-making performance: Motivation may play a significant role in driving information search behaviors, creativity, and other components of group decision making (Guzzo, 1986). He adds that there are many factors that could influence motivation in decision making groups such as the importance of the task, incentives, member involvement and so

on. Some of these factors were already mentioned and some will be discussed later. Future research should focus cn the motivation aspect because there is ample opportunity to explore the causes and consequences of motivation in decision-making groups.

However, research on work motivation has become increasingly complex and confused over the past several decades. Locke (1991) believes that the major cause for this confusion has been the existence of many theories with only a few frameworks trying to integrate them. Furthermore, he feels that a major reason for the difficulty of integration is that most of the theories pertain to different aspects of the motivational sequence (Locke, 1991). Thus, Locke (1991) offers his own motivational sequence covering many theories of motivation. In addition to Locke's framework, Naylor, Pritchard and Ilgen (1980) also defines the motivational process in a similar way yet adds three sets of contingencies. In this paper, we will be using these two frameworks as guidelines to present the different aspects of the motivation process.

Locke's Motivation Sequence, Hub, And Core

Locke proposes a new motivation sequence and integrative framework in which it presents all the major theories of motivation:

Insert Figure 2 about here

Needs. Looking at Locke's (1991) motivational framework, the sequence begins with needs. It is widely known that people have psychological needs (such as love, self-esteem) as well as physical needs (water, air). As a mean of survival, all humans must meet these two needs. Locke (1991) provides an appropriate list of observations which one can make about the nature and operation of needs. Here is a sample of some of these observations:

(1) Needs operate cyclically; they are never permanently satisfied. Life is a dynamic, not a static, process.

(2) Need frustration is experienced as pain, discomfort, or illness.

(3) Different needs entail different degrees of urgency (e.g., one can live only 2-4 minutes without air but may survive for weeks without food).

(4) A given need can lead to many different actions (e.g., people try many things to get self-esteem or the illusion thereof).

(5) Even though actions are ultimately motivated by
needs, they may not, in fact, lead to need satisfaction
(p.290).

As one can see, needs have many characteristics in which
people can fulfill by different means. I feel that motivation to
satisfy these needs is something that all individuals have. It
is hard to imagine that there would be very much (if any)
motivational loss in this part of the motivation sequence. The
two most well-known need theories are Maslow's need
hierarchy theory and Deci's intrinsic motivation theory.
Maslow's hierarchy is made up of five major needs: (1) food,
shelter, clothing, (2) personal safety, (3) acceptance,
belonging, (4) self esteem, status, and (5) self-realization
(Hill, 1991). According to this model, one has to fulfill one
level before an individual may be able to move to the next
level. Deci (Deci & Ryan, 1985) has also proposed a need
theory which asserts that people have innate needs for
competence and self-determination. Thus, recognizing needs
is the first step in the motivation sequence.

The motivation core. The second dimension of Locke's
framework is called the motivation core. In this part, people
have to discover the knowledge their survival requires,
including a code of values to guide their choices and actions
(Locke, 1991). Values can been seen as a link between needs

and the action in which an individual decides to take. There are three major motivation theories that take in account values and motives: McClelland's need for achievement theory, Miner's role motivation theory, and Vroom's expectancy theory. In terms of work motivation, McClelland's (1971) theory identifies values that are associated with successful entrepreneurship. Locke (1991) provides a few examples: the desire to achieve excellence as measured by some standard, the preference for moderate risk-taking, concrete feedback, and so on. Miner's (1978) theory identifies a set of values and motives that characterize a successful persons in the role of a manager: desire to lead, taking on an assertive role, liking competition, and so forth. Locke (1991) believes that those two theories have had some success in predicting action within the realm in which the theories apply.

Vroom's expectancy theory has also undergone considerable amount of research for the study of commitment decisions in groups. This theory argues that people act to maximize their expected pleasure or satisfaction. In an organizational setting, the expectancy theory attempts to predict the total amount of effort the person will exert on the job. However, Naylor, Pritchard, and Ilgen (1980) pointed out one major problem with the expectancy theory in regards to motivation: predicting overall level of effort a person exerts

to the job ignores the way in which the total set of resources is allocated across acts; it ignores the fact that the patterning of the resource allocation process is critical to understanding behavior. Thus Naylor, Pritchard and Ilgen suggests a new and improved expectancy theory in their theory of behaviors in organizations. This NPI version of the expectancy theory will be examined more closely when we look at their theory later in this paper.

The motivation hub. The goal/self-efficacy/performance linkages is called the motivation hub. These three theories explain the direct determinants of action (Locke, 1991). Following the arrows in Figure 2, expectancy and self-efficacy affect the goals people choose, but they also have direct effects on performance. In addition, goals/intentions are also direct motivational determinants of performance.

Goals and intentions. There has been a considerable amount of attention to the goal/intention line of research, especially to how goal setting affects motivation and performance. Research also has focused on the dimensions of goal-setting, such as goal difficulty, goal specificity, participation in the goal-setting process (e.g., Locke et al., 1981; Tubbs, 1986), and the process by which goal-setting affects behavior (e.g., Naylor & Ilgen, 1984). In Locke et al. (1981) study, they have found that goals are most likely to

affect performance under the following conditions: (1) range and type of goals (hard, or challenging goals improve task performance), (2) goal specificity (goals that are specific are better than vague goals), (3) ability, (4) knowledge of results or feedback (feedback is necessary if goals are to improve performance), (5) monetary rewards, (6) participation and supportiveness, (7) individual differences (e.g., high vs. low self-esteem persons), and (8) goal acceptance and choice. Although a few of these conditions do not have strong empirical support, they are all important aspects which researchers must consider before they conduct a study on goal-setting. More exploration of the nature and effect of all these factors in goal setting is clearly warranted (Locke, 1981). In addition to the general goal-setting studies, there has been some research on group goal setting as well (e.g., Pritchard et al., 1988; Koch, 1979). In the Pritchard et al (1988) study, they found that group goal setting increased productivity 75% over baseline. In general, goal-setting has been consistently found to enhance performance.

Rewards. The outcomes of group interaction are often described in terms of reward and costs. The concept of reward refers to those aspects which the individual finds pleasurable, enjoyable, gratifying, or otherwise satisfying (Shaw, 1971). The use of rewards can also be used to alter motivation and

behavior. Recall that Guzzo (1986) suggests five determinants of effective group decision making: task, rewards, resources, autonomy, and appropriate performance strategies. Groups can attain their rewards on the basis of whether or not the group completed its task and reached its goal.

Rewards for group achievements can affect both the effort and coordination of a group; effort is then affected through the incentive value of the rewards (Guzzo, 1986). When one thinks of an incentive value, they may immediately think of monetary rewards. Locke et al. (1981) say that money may be an effective method of improving performance, but the amounts involved must be large rather than small (e.g., $100 rather than $1). Money is not the only incentive. Pritchard (1988) stated that past literature on rewards found that both financial and nonfinancial incentives can indeed increase performance when the incentive system is properly designed. Rewards that an organization can provide groups include pay, recognition, and time off.

Guzzo (1986) points out a couple disadvantages about reward systems. First, rewards for group performance are generally not very common in organizations. Second, rewards are more likely to be effective only when groups are intact and long-term. Rewards can be effective or ineffective depending on how they are used. Thus, as true for tasks, the proper

administration of rewards for group performance can be expected to facilitate effectiveness in decision making (Guzzo, 1986).

Satisfaction. The last dimension of the motivation sequence proposed by Locke (1991) attempts to explain the determinants of work and job satisfaction. A number of theories try to find which job elements causes satisfaction or dissatisfaction in the work place. Hackman and Oldman (1975) developed the Job Diagnostic Survey to find what elements of the job motivates workers and brings the most satisfaction. They argued that the most satisfying jobs possess characteristics such as personal significance, feedback, autonomy, and task identity.

Referring back to the motivation hub, goal-setting theories (e.g., Pritchard et al., 1988) and social-cognitive theory both view goal not only as objects or outcomes to strive for but they can also be used as standards for evaluating an individual's performance. Thus, according to Locke (1991) goal success is viewed as leading to self-satisfaction and failure to self-dissatisfaction (p.294).

The motivation sequence, hub, and core is not a one-way process. It a cycle in which organizational commitment is the connecting loop that brings the employee back to the beginning of the cycle. Actually, Locke (1991) argues that the sequence

really begins with goals rather than needs or values because intervention at the need stage is impossible since needs are innate.

Comments On The Model

I believe this model is very successful in integrating previous models of motivation. It is simplistic yet it effectively demonstrates and explains how different theories pertain to different elements of the motivation sequence. Locke (1991) adds that "any given theory may be correct or incorrect in one or more of its tenets, but even when correct, a given theory is more likely to complement than to be at odds with other theories" (p.295). On the other hand, I feel that there is an element that did not receive attention in the model: confidence. Confidence should and does play a critical role in determining if and how certain choices will be used by the decision makers, thus, it should be included in the motivation hub in Locke's model. Confidence will be defined and discussed more in detail later in this paper.

The Motivation Process: A Theory Proposed by Naylor, Pritchard and Ilgen ("NPI Theory")

The second framework of the motivation process that will be discussed is offered by Naylor, Pritchard and Ilgen (1980). According to their model, the major constructs associated directly with the motivation process are basic

needs, temporary need state-arousal, and affect, all of which feed into the valence of outcomes; the three sets of contingencies, plus the utility of products, utility of acts, and the resulting actual acts (Naylor et al., 1980). Switzer and Sniezek (1991) believe that the NPI theory is very useful for research for the reason that it explicitly takes into account the role of judgement and decision making in explaining task motivation.

Recall in Locke's motivation sequence, Locke used Vroom's expectancy theory to help define the motivation core (values and motives). Yet Naylor et al. (1980) have found one major problem with this old expectancy theory which was also discussed earlier. Attempting to correct this problem, Naylor et al. suggested a new and improved expectancy theory. Sniezek, May, and Sawyer (1990) believe that this new expectancy value theory is practical for studying group commitment for two main reasons: (1) commitment is operationalized in terms of behavior following from decisions, not affect and, (2) the theory gives special treatment to the decision maker's expectations--expectations regarding the relationship between allocation level to an act and the consequent reward are represented by a series of contingency relations (p. 2). These contingency relations provide a useful

understanding to the motivational line of research in which we will now see.

Although this model involves many constructs that directly affect the motivation process (e.g., valence or anticipated affect) we will not discuss them in detail; we will refer to them when necessary. Thus, for simplicity sake we will only concentrate on the three major points at which contingency judgments occur in this model: act-to-product, product-to-evaluation, and evaluation-to-outcome. Some examples of the contingency functional relationships are shown in Figure 3.

Insert Figure 3 about here

Act-To-Product These are the perceived contingencies between a person's acts and the results of these acts (product). In other words, the act-to-product contingency relationships involve the relationship between the amount of personal resources (e.g., time and energy) devoted or committed to the act and the level of quantity and quality of the product produced (Naylor et al., 1980). Examples A-I show some act-to-product contingencies. In example H, the relationship is an inverted U-shape function. This is when high levels of time and energy (effort) result in less of the product.

Product-To-Evaluation   The contingency here is between the products produced by the individual and the evaluation of his or her performance. Naylor et al. (1980) proclaim there is a number of different evaluators that exist: examples include a supervisor, manager, a subordinate, or even the person himself or herself.   Naylor et al. describes an important assumption when addressing the evaluation system:

> A central tenet of this theory is that this evaluation system is intimately associated with the concept of roles. That is, the evaluation system used by a given other (or the person himself or herself) is related to and indeed defines the role that other has for the individual. This evaluation system defines the products the person is expected to produce, and also describes their relative importance (p.39).

Some product-to-evaluation contingency examples are shown in J-Q in Figure 3.

Evaluation-To-Outcome   The third set of contingencies (evaluation-to-outcome) reflect the external reward system as perceived by the individual. These contingencies are the person's perception of how his or her performance is reflected into outcomes from the environment (Naylor et al, 1980). Examples R-X depict these contingencies.   In example U, there is no relationship between favorableness of the evaluation and

the level of the outcome, but some constant level of outcome is always received (e.g., pay levels for hourly employees). Comments on the Three Sets of Contingencies. Each of these three contingencies is formed in three different ways making them distinct, yet they also share some common features: they are perceived contingencies that may not reflect the actual state of things; they are the building blocks for rational behavior; and they are capable of change as the person gains more experience in the environment, as the environment itself changes, or through verbal mediation (Naylor et al., 1980). The components of the NPI theory, especially the contingencies found in the motivation process are useful tools in establishing a basis of the resource allocation process. The resource allocation process, as we know, is the key for studying task motivation or the group decision-making process as a whole.

So far, motivation has been a prominent issue in this paper. Specifically, we have examined two major frameworks of task motivation: Locke's (1991) motivation sequence and integrative framework, and the NPI theory involving how three sets of contingencies affect the resource allocation process. Although we have chosen the type of task we are interested in (e.g., Mcgrath's decision-making task), we have not discussed in depth the group decision making process itself. The aim

here was to find out how and why individuals choose to allocate their resources or distribute their time and effort when involved in a group decision making task. This is not to imply that the process is unimportant; it is. Thus, we will now turn to the group decision making literature. In other words, we have studied how groups work *harder* but now we are interested in how they work *smarter*.

Decision-Making Process

Before we can see how groups can be effective without considering the motivational component, the decision-making process must be reviewed. The purpose of a decision-making group is appropriately described in a few sentences by Josephine Klein (1963):

> The task of a decision-making group is to reach unanimous agreement on a course of action. Such agreement depends on a unique combination of the value of the members and the facts at their disposal. The decision-making sequence therefore requires exchanges of information and of views before agreement can be reached. All other contributions to the discussion are irrelevant to the problem under consideration and must be treated as expressive of personal idiosyncrasies (p.3)

According to Simon (1977), decision making is made up of four types of activity: intelligence, design, choice, and review.

Guzzo (1986) explicitly explains each of these phases. The following are brief descriptions of these four activities: the intelligence phase involves determining when decisions should be made when given a wide variety of circumstances; the design phase is concerned with creating, developing, and assessing possible courses of action; choice refers to the process of choosing one course of action from those presented in the design phase; and the fourth phase, review, involves monitoring past choices to see if chosen actions are properly implemented and to determine if new decisions must be made (Guzzo, 1986).

The intelligence and design phases are concerned with recognizing a decision-making task (e.g., social dilemma) and having possible courses of action (e.g., verdict being guilty or not guilty). These first two phases are relatively simple and comprehensible. On the other hand the third and fourth stages, choice and review, have both received a great amount of research attention. Therefore, the last section of this paper will discuss how groups choose courses of action (by means of social influence) to achieve group decision making effectiveness. We will also examine how group members and groups evaluate the "goodness" of their performance or product.

Non-Motivational Factors Affecting Group Effectiveness

By this time, we have gained an understanding on how motivation play a major role in explaining how groups work together. This is in terms to how much each member contributes to the group task. Just knowing how hard a group works together is not sufficient enough to know whether it will be effective. For example, imagine a group whose members are all history majors. As a group task, they were assigned physic and mathematical problems to solve within ten hours. Even though they may have worked hard together and had a lot of motivation to finish, there is a great possibility that they would not have solved as many of these problems as opposed to if they were assigned history questions for two hours instead. The point here is that effort and motivation together is not the only element a group can rely on in order for it to be successful, there are other components as well.

Non-motivational factors that contribute to group effectiveness includes ability or expertise of members, equality of contribution, group cohesiveness, and social influence. Ability or expertise of members and group cohesiveness are both part of group input. Group input is what is true about the people in the group. For example, members in a group do not become experts in the field of psychology, per se, during the time they interact in a group. Input are the characteristics or feelings that the individuals have when

entering in the group. On the other hand, equal contribution and social influence are part of the group process. These are the things that an individual experiences when interacting in a group. In the subsequent section, the impact and contributions of social influence will be discussed. I have chosen to further explain this element because I think it adequately shows how one of these non-motivational factors (out of several including the ones introduced above) could have great impact on group effectiveness.

Social Influence Brown (1988) suggests that groups are motivated to establish and maintain uniformity in the group. For many years, 'social influence in groups' was referred to as 'conforming to the majority,' thus, there was an emphasis on majority influence in the sense of 'prevailing.' In addition, Brown (1988) believes that the main explanations for this conformity to the majority suggest that three main motivations are at work: the need to depend on others for information about the world and to test the validity of our own opinions; the achievement of group goals which is facilitated by a uniformity of purpose; and the need for approval arising out of not wishing to seem different (p122). From this perspective, I think it is very insightful to see how social influences (the majority) can affect different aspects of

motivation. More simply, the majority position 'motivates' individuals to accept the position it proposed.

In various studies, the focus of research has recently switched to the minority influence. Minorities, it turns out, are not not completely passive recipients of influence from the majority but can elicit some impact on group members (Moscovici et al., 1985). Similarly, Nemeth (1986) found that there are differential contributions of the majority and minority influence to persuade individuals to take a certain position. For example, he found that majorities *do* exert more influence in the sense of prevailing and people are much more likely to adopt the position the majorities proposed. However, those exposed to the minority viewpoints are stimulated to think in more divergent ways; they are more original, they use a greater variety of strategies, they detect novel solutions, and more importantly, they detect correct solutions (Nemeth, 1986). In short, people tend to be *better* decision makers because they attend to more aspects of the situation and reexamine premises.

An interesting contribution of the majority was introduced by Asch (1956). In his experiment, he used confederates to form the majority condition. The majority view was clearly incorrect but the subjects still adopted their view. Asch found that there was a strong willingness to 'go

along with' the majority and that, according to him, was precisely the motivation behind most of the conforming responses. Furthermore, Asch found that subjects lacked confidence in their own judgement, assuming that the others in the experiment were privy to some additional information that was guiding their responses (1956). This finding among the others suggest that social influence does have a great impact on group decision-making effectiveness (e.g., better quality decisions, more creativity). Asch's specific finding on how social influence directly affects the confidence of group members is of particular interest in this paper. Thus, the confidence literature will be examined more closely in the following section.

Rationale For The Confidence Literature Review

Recall the motivation sequence model proposed by Locke (1991). He placed satisfaction as the final segment of the process and then he believes that the individual or the group returns back to the beginning of the cycle (to goals or values). This is a very representable integrative framework of many cognitive and work motivation theories, but I feel that there is another element that should be a part of this sequence: the confidence research.

Before I describe confidence research, I would like to propose some underlying rationale as to why I feel confidence

should be another crucial aspect that should be added to the motivational research. It has been previously suggested that one of the major sets of contingencies, the product-to-evaluation contingency, in Naylor, Pritchard and Ilgen's (1980) theory was defined as the relationship between the products produced by the individual and the evaluation of his or her performance. In other words, what are the individual's beliefs about the quality of this product? Beliefs about how good a person's judgments or choices are can be labeled the confidence an individual holds about his or her own judgment or choice (Sniezek, 1991). On a group level, Sniezek (1991) describes two types of confidence: member and group confidence. Member confidence is each individual's confidence about the group's choice and group confidence is the group's confidence about the group's choice.

In addition to the motivational research, confidence should also be an very important element in decision-making. For example, Simon (1977) had a review process as one of the four phases in his decision-making sequence. To reiterate, activities in the review phase involves monitoring past choices to see if chosen actions are properly implemented and to determine if new decisions must be made (Guzzo, 1986). Again, confidence can be integrated in this phase because the individual not only reviews past choices, he or she also sees if

those choices were "right." And lastly, we have seen how other factors, such as social influence, can have a tendency to affect how confident an individual would feel about his or her decision. For these reasons, it is surprising to see the confidence literature as a fairly new line of research since choice and evaluation have been important constructs in various motivational and decision-making theories.

Group Evaluation Before a group can be confident, it first needs to know what criterion it can be confident about. More simply, how does a group measure the quality of their judgment? Einhorn, Hogarth and Klempner (1977) define the quality of performance in terms of how close the group judgment is to the true or actual value being predicted once it is known. They offered four different models to demonstrate how groups evaluate the quality of their performance. Einhorn et al. (1977) describes each model:

>   (a) randomly picking a single individual
>
>   (b) weighting the judgments of the individual group member equally (the group mean)
>
>   (c) weighting the "best" group member (i.e., the one closest to the true value) totally where the best is known, a priori, with certainty

(d) weighting the best member totally where there is a
given probability of misidentifying the best and getting
the second, third, etc., best member (p.158)

The authors developed these models to simply say that if
groups were to use one of these models under a certain
condition, then a certain level of performance would result.
These four models give a good foundation for other researchers
to begin understanding how groups evaluate their performance
and then form their confidence about it.

Group Confidence Research   Sniezek (1991) states that there
are two characteristics of a group who faces a decision
making task:

First, the members of the group share the objective of
maximizing the quality of their decision with respect to
some identifiable criterion, and second, the group
operates under uncertainty about which alternative is
superior throughout the task...hence, the group's own
evaluation of its product is often an important--and
sometimes the only ingredient in determining group
effectiveness (p. 4).

These two features are consistent to what we have been
examining throughout this paper. The members of the group
want or are very motivated to reach an optimal decision (e.g.,
sharing the same objective) and the groups are assigned to a

decision making task which, according to McGrath (1984), is defined as tasks for which the preferred or agreed upon answer is the correct one--a 'real' correct answer is not known to the members (e.g., groups under certainty). In addition, confidence is thought of as the evaluation of the product and as stated previously, confidence is an important criterion to measure group effectiveness. Thus, groups with these two features offered by Sniezek (1991) will be used in the present study.

How do we measure group and member confidence? First of all, Sharp et al. (1988) distinguishes two types of probability assessments: calibration is the ability to appropriately assign probability levels to judgments (or answers) and resolution, on the other hand, refers to the judge's ability to discriminate between right from wrong answers by assigning confidence judgments to right and wrong answers. Sniezek (1991) tells us how we can use calibration in order for us to measure group and member confidence:

> In situations in which objective decision quality cannot
> be known, group confidence can be described only in
> terms of its absolute level (e.g., how confident a group
> is), or its magnitude relative to confidence assessments
> from another source, such as from individuals. But with
> the availability of information about outcomes, group
> confidence can be described relative to the actual level

of decision quality (e.g., how over- or under confident a group is) (p. 7).

In the present study, we will describe group confidence relative to the actual level of decision quality for the reason being we will be conducting a laboratory experiment. This will then allow us to measure group confidence by allowing us to compare the actual answer to the one chosen by the group.

Over/under confidence. Over/under confidence have been common occurrences in difficult decision making tasks. Over/underconfidence is defined as the difference between degrees of belief (subjective probabilities) and a relative frequency (percentage correct) (Gigerenzer, in press). For example, the overconfidence effect occurs when the mean confidence is higher than the percentage of correctly answered questions. Why do people or groups experience this over/underconfidence effect? It has been said that the use of several people deciding on a decision-making task (by sheer numbers only) may increase confidence in judgments. However, this does not necessarily increase judgment accuracy (Gigerenzer et al., 1992; Sniezek, 1991). Also, the effects of choosing on confidence suggest that overconfidence is most likely to be severe in spontaneous, less contemplated, choices (Sniezek et al., 1990). Another possible source of overconfidence may be framing. For example, as suggested by

Koriat, Lichtenstein, and Fischhoff (1980), overconfidence may be due to a biased search for confirming evidence prior to choice, as well as selective attention to confirming evidence following choice. Thus, framing could lead to overconfidence because of biases either in the generation of evidence prior to choice or in the evaluation of evidence following choice (Sniezek et al., 1990). I believe this is a very good point; confidence may be evaluated *before and after* a decision is made.

I think there are numerous reasons as to why people may feel over- or underconfident about their choices or judgments such as general biases in information processing (e.g., confirmation bias), increased group discussion, groupthink, or perhaps having expertise on the subject, and so on. The point of the matter is that this phenomenon does exist. As a result, it may have detrimental effects such as developing inaccurate judgements. So how can individuals and groups improve their calibration and resolution skills?

Sniezek and Henry (1989) found that group judgments were, with a few exceptions, significantly more accurate than mean or median individual judgments. Their reasoning to this is that there are two factors related to increase accuracy in groups: (a) high disagreement, e.g., large variance, in initial judgments, and (b) group judgments outside the range of initial

individual judgments. In addition to being more accurate, groups were generally more confident confident than individuals. I think this explanation of more accurate judgments in groups have the same effects of the minority influence. Recall that a movement toward the minority position in groups does lead, in general, to more accurate judgments (Nemeth, 1986).

Sharp, Cutler, and Penrod (1988) examined whether feedback concerning the appropriateness of confidence judgments improves calibration and resolution skills. Their hypotheses that the feedback reduces overconfidence and improves calibration was not supported, however, they found that feedback does improve resolution skills across sessions. Sharp et al. (1988) admitted that their experiment in testing whether feedback influences over/underconfidence or calibration was very weak. Thus, a more reliable method might find different results and conclude a possible significant interaction between feedback and improved calibration skills. It is important to note that overconfidence in groups is not always dangerous, it can also be useful in some situations. What needs to addressed, according to Sniezek (1991), is not to place great emphasis on high group confidence, but to study *appropriate* group confidence. This is a more reasonable question to investigate because it is

common knowledge that there are certain situations whとて
high confidence may be beneficial (e.g., test taking).

A question that often arises when examining the
confidence research is, does group satisfaction after
completing the task lead to high group confidence? Sniezek
(1991) claims group members could be satisfied with the
process (or the fact that they reached some decision), but
highly uncertain about that decision. The difference is that
satisfaction is an attitude toward the task, process, or
decision and confidence is a belief about the quality of the
decision. Maybe a more interesting question would address the
reverse, is a highly confident group necessarily have to be
satisfied?

A Motivational Perspective On Confidence Group members,
when together, tend to give greater time and effort to decision
making tasks than if any one of them completed it alone. Data
have supported the idea that greater time and effort exerted by
an individual will reduce their subjective uncertainty
(Sniezek,1990). On the other hand, it is possible for an
individual to have more confidence if they have exerted more
time and effort into a certain task? Take this one step
further, will a group have high confidence if they put forth a
high level of effort? This becomes the main issue at hand.

Summary And Discussion

This paper addressed several issues concerning task-oriented groups. First of all, organizational work group behavior should be an important line of research because groups exist everywhere and through them, work is accomplished. They share a common goal of completing a specific decision making task. I have chosen to focus on McGrath's definition of the decision making task where the "correct" answer is the preferred or agreed upon answer. The second part of this paper centered around motivation in which we aimed to find out how and why individuals choose to allocate their resources or distribute their time and effort when involved in a group decision making task. Specifically, social dilemmas and social loafing were defined and in addition, Locke's motivation sequence, hub and core and the NPI theory were discussed in detail. To re-iterate, these motivation components gave insight on how *hard* groups work together. The third section of this paper then focused on how groups work *smarter* on decision making tasks. The decision-making process was defined and in addition, non-motivational factors affecting group effectiveness (e.g., social influence) was also examined. The final section centered around the group confidence research. Although confidence is a difficult phenomenon to study within the behavioral science line of

research (e.g. determining the causes and cures for overconfidence), it should be an important element within the motivation research as well as being part of the decision making process. Potential relations may exist between these concepts, thus, future research is necessary to explore this issue.

Method

Participants

The 123 subjects who participated in the study were randomly drawn from a subject pool of undergraduates enrolled in an introductory psychology class at the University of Illinois at Urbana-Champaign. The age range was 18-22 and there were 51 males and 72 females. Year in school also varied (freshman=83, sophomores=21, juniors=13, seniors=6). They took part in this research as a means of partially fulfilling a course requirement. The participants were run in groups of three or they did the experiment individually. They were randomly assigned to one of four conditions: group/distracted (GD), group/non-distracted (GN), individual/distracted (ID), and individual/ non-distracted (IN). Each of the conditions consisted of 34 groups (14 distracted and 14 non-distracted; N=102) and 21 individuals (10 distracted and 11 non-distracted).

Procedure

The research location was a large central room attached to four smaller rooms. Each room was equipped with a round table, three chairs, and a one way mirror. They also had doors to ensure seclusion from the other groups. In addition, there was a fifth room which overlooked the other four rooms. The experimenter was able to watch all the subjects simultaneously through the one-way mirror during the second part of the experiment. Upon arrival at the experiment, each participant selected a plastic paper clip out of a bag and was seated in the largest room. The bag contained clips of four colors: red, blue, green, and yellow. The number of clips inside the bag was equal to the number of subjects present for the experiment. This process determined the person's small group or individual assignment. Depending on the color of clip, the experimenter handed out the different packets. Red and blue clips were handed the distracted condition packet and the yellow and green clips were handed the non-distracted packet condition.

Before the groups were formed, general instructions for persons in all four conditions were handed out. For example, persons in the group/distracted condition read the following: "In your packet you will find the following: a consent form, a pen, and two questionnaires labeled A and B. Please make sure

you have all of these items. If you are missing any of them, inform the experimenter at this time. These are the general instructions for this experiment. Please read them thoroughly and further instructions will be given later.

Step 1: Read carefully and sign the consent form.

Step 2: Fill out questionnaire A individually.

Step 3: After completing questionnaire A, you will form groups of three which will be determined by the color of your poker chip. **Red chips will go to room one, blue chips to room two, yellow chips to room three, and green chips to room four.** When you are in your group and in your assigned room, there will be a questionnaire on the table for your group to answer. One group answer sheet is provided. This is the same questionnaire as questionnaire A, but you will be answering it as a group. You will answer the questions to the best of your group's knowledge. Your group will have ten minutes to complete the questionnaire. USE THE TIME HOWEVER YOUR GROUP WANTS TO. After the ten minutes, the experimenter will then collect your group's answer sheet.

Step 4: The experimenter will tell you when to start questionnaire B. You will fill this out individually.

Once you have read these instructions, please start step 1."

(See Appendix A for instructions for the other three conditions). When it was clear that all subjects had read and understood these instructions, they read and signed the consent form and started on questionnaire A. Once questionnaire A was completed by all subjects, they were directed to go to their assigned rooms. Before they entered the rooms, the experimenter orally instructed the subjects. In all distracted conditions, the experimenter told the subjects, "Remember that you (or your group) can use this time however you want. You (Your group) does not have to finish the questionnaire." In the non-distracted condition the experimenter recited, "Please use all of this time to answer the questions to the best of your (your group's) knowledge." In all the experiments, the experimenter was consistent when she orally instructed the subjects. All three questionnaires (two individual A,B; one group C) contained an information sheet on local crime and had 8 main questions concerning statistics of the local crime rate of Champaign, Illinois. Each question had three parts. First, the individuals or groups were asked to state their best estimates to forecast the future crime statistics of the same city. Second, subjects were asked to set confidence intervals around their individual or group judgments. We label this new variable Uncertainty. The equation for this is Uncertainty = upper limit - lower limit.

The smaller the uncertainty, the more confident the individual or group is. And lastly, using a Richert scale ranging from 1-9 (1-not at all confident, 9-very confident) they also circled how confident the group or individual was on their/his/her estimate. We will call this as the Confident Rating variable. (See Appendix B for an example of a questionnaire question). During the ten minutes the group or individual was completing the questionnaire, the experimenter watched the subjects from the fifth room. All four rooms had a one-way mirror allowing the experimenter to observe all conditions at the same time. Notes were taken for all the distracter conditions by the experimenter. The time for each activity (games, magazines, comics, task, other) was recorded every minute. The "other" category included activities such as the subjects talking with each other, subjects sleeping, or subjects just doing nothing. After the ten minutes, all participants were allowed to return to the main room and start the third and last questionnaire.

In the third questionnaire they had to complete individually, questions concerning the group dynamics were asked. The following is a list of these variables with a short description: Time=time spent on Questionnaire B, Effort=How much effort did they put into the task, Search=whether subjects worked hard in searching for the best possible estimates, Each Crime=whether subjects worked on each crime

individually, Rational=whether subjects used a rational approach in estimating, and Random=whether subjects randomly wrote down estimates. These questions reflected how the group measured their perceived effort. There was also a question asking subjects whether they liked working on the task by themselves or with their group (Like). And lastly, there was a question asking the overall confidence of their group's and individual accuracy (Overall Confidence) in all three questionnaires. Note that the same questions that were asked in the group task were also asked in the individual questionnaire with the exception of having them be on the individual level. After the participants completed questionnaire B or C, they were debriefed, thanked, and dismissed.

Effort was manipulated by having or not having distracters in the four smaller rooms where each group answered the questionnaire together. Since there were four rooms, two rooms had distracters and the other two rooms had no distracters. Distracters consisted of visuals and objects. Visuals included comic strips on the walls or on the table, fashion catalogues, the daily school newspaper, and magazines. Objects included small hand games such as the Etch n' Sketch and larger games like Jenga and Labyrinth. The other two rooms had nothing but the table and three chairs provided.

When there were times of imperfect attendance (N<12), groups of three were formed and the remaining subjects did the same group task individually. For example, if only 11 subjects attended, three groups would have formed and one subject would go alone to one of the smaller rooms by him or herself (in the distracted or non-distracted condition. The other remaining subject would stay in the large room and it was considered to be an additional non-distracted room since there were no distracters present. They both would answer the second questionnaire individually. Thus, all data would have two main comparisons: group vs. individual and distracted vs. non-distracted.

Results

Confidence and accuracy were dependent variables in a 2 Unit: group vs. individual X 2 Environment: distracter vs. no distracter ANOVA. Analyses were with Units and Environment as between-subjects factor and others were with within-subjects factor. T-Tests were done for planned comparisons and post hoc multiple comparisons were analyzed using Tukey's method for the dependent variables accuracy and confidence.

Depending on the experimental condition, effort was manipulated by placing or not placing distracters in the subjects' rooms. To make sure these distracters were effective, a manipulation check was done by asking the

subjects to answer post-questionnaire questions. The difference between the means on the six post-questionnaire measures for each condition are shown in Table 1. Any two groups with a common alphabetical letter are not significantly different (p < .05).

Insert Table 1 about here

A significant main effect between group/distracted and group/non-distracted was found on all the post-questionnaire dependent measures. In addition to the Tukey's method, T-Tests indicated significant main effects between the non-distracted and distracted conditions in testing the same post-questionnaire dependent measures. As predicted, we found that the no distractor subjects rated these variables significantly higher than the distractor condition: Time (x_d=4.99 vs. x_n=7.73, t=0.000; df=60,61; p < .05), Effort (x_d=2.30 vs. x_n=2.99, t=0.000; df=60,60; p < .05), Search (x_d=2.33 vs. x_n=2.98, t=0.000; df=60,61; p < .05), Each crime (x_d=2.30 vs x_n=2.66, t=0.000; df=60,61; p < .05), Rational (x_d=2.58 vs. x_n=3.06, t=0.000; df=60,60; p < .05), Random (x_d=2.37 vs. x_n=1.92, t=0.001; df=59,60; p < .05). There was also a significant interaction effect of Time between the four conditions. Overall, mean Time was significantly higher

(p < .05) in the group/non-distracted condition than all the other conditions. Figures 4-9 displays the differences for these dependent variables.

Insert Figures 4-9 about here

It was hypothesized that the non-distracted subjects would have higher confidence than the distracted subjects. Tukey's method of multiple comparisons was also used to test for significant differences on the confidence rating measures: Uncertainty and Confidence Ratings for each questionnaire A,B, and C. From the Confidence Ratings measure, we compared 24 confidence means (8 from each questionnaire) between all four conditions. As expected, there were no main or interaction effects in Questionnaire A because the manipulation was administered after Questionnaire A. However, there were significant main effects between the group/distracted and group/non-distracted conditions. In both Questionnaires A and C, these two conditions were significantly different 62.5% if the time: or in other words, they were significantly different in 5 out of 8 scores for each Questionnaire B and C. The group/no distracter confidence mean was significantly higher (p < .05) in all comparisons. We did not, however, find similar significant differences between the individual/distracted and

individual/non-distracted conditions. Tables 2-2a displays the main effects on both questionnaires.

Insert Tables 2-2a about here

None of the comparisons involving the Uncertainty measures revealed any significance.

In addition to Tukey's multiple comparison method, we used the two sample T-Tests to test for significant main effects for the Confidence Rating measure. As expected, there were no significant main effects between the non-distracted and distracted conditions for Questionnaire A. But like before, we do see significant differences between these two groups when comparing Questionnaire B and C. For Questionnaire B, 7 out of 8 dependent confidence measures revealed the non-distracter condition as having significantly higher confidence ratings than the distracter condition: Sexual Assault & Attempts (x_d=4.12 vs. x_n=5.39, t=0.008; df=24,27; p < .05), Robbery (x_d=4.08 vs. x_n=5.14, t=0.042; df=23,27; p < .05), Aggregated Battery (x_d=4.04 vs. x_n=5.46, t=0.005; df=24,27; p < .05), Aggregated Assault (x_d=3.75 vs. x_n=5.29, t=0.004; df=23,27; p < .05), Battery: Commercial (x_d=4.04 vs. x_n=5.07, t=0.045; df=23,27; p < .05) Battery: Residential (x_d=3.96 vs. x_n=5.26, t=0.013; df=23,26; p < .05), Theft: Under $300 ($x_d$=3.75

vs. x_n=5.85, t=0.000; df=23,26; p < .05). We see similar results in Questionnaire C where 8 out of 8 dependent confidence measure also revealed the no condition as having significantly higher confidence ratings than the distracted condition: Murder & Attempts (x_d=4.60 vs. x_n=5.31, t=0.031; df=57,61; p < .05) Sexual Assault & Attempts (x_d=4.69 vs. x_n=5.31, t=0.043; df=58,61; p < .05), Robbery (x_d=4.35 vs. x_n=5.05, t=0.022; df=59,60; p < .05), Aggregated Battery (x_d=4.44 vs. x_n=5.08, t=0.033; df=58,60; p < .05), Aggregated Assault (x_d=4.44 vs. x_n=5.40, t=0.002; df=58,61; p < .05), Battery: Commercial (x_d=4.38 vs. x_n=5.11, t=0.018; df=59,61; p < .05) Battery: Residential (x_d=4.37 vs. x_n=5.02, t=0.040; df=58,61; p < .05), Theft: Under $300 ($x_d$=4.82 vs. x_n=5.53, t=0.026; df=59,61; p < .05). The no distracter condition also rated the dependent variable, Overall Confidence, significantly higher than the distracter condition (x_d=4.10 vs. x_n=5.21, t=0.000; df=60,61; p < .05). Figure 10 displays the differences between all four conditions for the Overall Confidence dependent measure.

Insert Figure 10 about here

The results of both Tukey's multiple comparison method and T-Test have supported our hypothesis that people with a low

level of effort (distracted subjects) will have lower confidence than people with a higher level of effort (non-distracted subjects).

Mean Confidence Ratings for each questionnaire were compared as a within-subjects factor. As we see in Figure 11, the non-distracted subjects became more confident in Questionnaire B while the distracted condition became less confident. This is where we see the significant difference between the two conditions. However, as the subjects go back to individually answering Questionnaire C, these two groups become more equal. For both the non-distracted and distracted conditions, there was a significant difference between Questionnaires A and B (p < .05) for the same subject. There was no significance found when comparing Questionnaire C for the non-distracted condition. But for the distracted group, Questionnaire C was significantly higher than Questionnaires A and B.

Insert Figure 11 about here

We also used the two sample T-Tests to test for significant main effects for the Confidence Rating measure between individuals and groups. There were no significant differences between these two group in both Questionnaires A

and C. In Questionnaire B, there were only 2 out of 8 dependent variables where groups had significantly higher confidence ratings: Burglary: Commercial (x_i=3.89 vs. x_g=5.00, t=0.038; df=18,32; $p < .05$) and Burglary: Residential (x_i=3.84 vs. x_g=5.13, t=0.019; df=18,31; $p < .05$). When comparing the post-questionnaire dependent measures, groups had significantly higher scores for the Effort (x_i=2.30 vs. x_g=2.64, t=0.043; df=20,101; $p < .05$) and Each crime (x_i=2.86 vs. x_g=2.42, t=0.035; df=20,101; $p < .05$) variables. Groups also rated the dependent variable, Overall Confidence, significantly higher than individuals (x_i=3.43 vs. x_g=4.91, t=0.035; df=20,101; $p < .05$). Refer back to Figure 9 for the Overall Confidence measure. For all the dependent measures from Questionnaires A, B, C and for the post-questionnaire questions, all the T-Test results are marginally significant for individuals vs. groups whereas it is moderately to extremely significant for the no distracter vs. distracter conditions.

There was also a couple significant differences when looking at the Like variable. The individual/non-distracted had significantly lower ratings than the group/distracted and group/non-distracted conditions. Although the individual/non-distracted was not significantly different from the individual/distracted condition, subjects in the individual/non-distracted condition still rated Like lower than

the individual/distracter condition. Figure 12 displays the differences between all four conditions for the Like variable.

Insert Figure 12 about here

Aside from measuring confidence, we also used post hoc tests to measure the dependent variable, accuracy. First, we checked for skewness and then computed log transformations for each estimate. Differences in judgment accuracy across conditions were assessed using Tukey's multiple comparison test with the absolute percent errors (APEs) for the 24 estimates as the dependent measures. Despite differences in effort and confidence, there was no evidence that any of the conditions were significantly different in accuracy.

Correlations between the dependent variables: Overall Confidence, Time, and Effort were computed for all subjects. The correlation between Overall Confidence and Time across the 123 subjects was positive and significant ($r = .51$, $p < .0002$). The correlation between Overall Confidence and Effort was positive and significant ($r = .71$, $p < .0002$). The correlation between Time and Effort was also positive and significant ($r = .58$, $p < .0002$).

Discussion

This study revealed significant confidence differences between people who exerted a high level of effort and people who exerted a low level of effort. First, we hypothesized that the presence of distracters will divert the subjects' attention to different tasks other than the intended decision making task. Thus, level of effort was predicted to be low with distracters and high without distracters. Second, we hypothesized that subjects in the non-distracted condition (high effort) will show higher confidence levels than subjects in the distracted condition (low effort). And finally, we hypothesized that groups will be more confident than individuals and will also outperform them in both the distracted and non-distracted conditions. This was predicted since, in past studies, groups have performed better than individuals (Chalos and Pickard, 1985; Harkings, 1987; Latane, 1986; Sniezek and Henry, 1989) in addition to having higher confidence levels (Davis and Ono, 1988; Nemeth, 1986; Sniezek and Henry, 1989).

The manipulation of effort was successful since subjects in the non-distracted condition had significantly higher measures of effort than subjects who were in the distracted condition. This finding emphasizes the importance of considering what affects motivation/effort for individuals

and groups. Guzzo (1986) believes that there are many factors that could influence motivation in decision making such as the importance of the task, incentives, member involvement, and so on. In this particular study, it was difficult to provide monetary rewards because of limited funds. In addition, incentives were a problem since all subjects were given equal credit for just completing the experiment; it did not matter whether the subjects were interested in the topic or not. Yet, as we have seen here, there was an effect of distracters on motivation. Why? Here is one possible explanation. Recall that motivation/effort is a resource allocation process in which commitment in the form of time and energy is distributed across competing acts. Providing distracters forced subjects to decide how they should distribute their effort across a variety of activities. The distracters were very attractive and fun, so in many cases subjects were diverted to these distracters instead of devoting most of their time and energy to the assigned task. In contrast, subjects who had no distracters had less choices of activities and therefore, committed most of their time and energy to the task. Of course, there were other activities in the non-distracted condition such as sleeping, doodling, biting nails, talking to other members of the group, etc., that the subject(s) could have chosen to do other than the task. However, the

important difference between the distracted and non-distracted conditions is that in the distracted condition, there were *more* competing acts to choose from.

Another possible explanation would be that subjects measured their effort by evaluating how much time they spent on the task. Results revealed that the distracted condition spent the least amount of time on Questionnaire B. This may be an issue of work vs. play. In this particular study, it was observed that once subjects have seen the distracters, they finished their task (work) as quickly as possible and then spent the rest of their time with the distracters (play). These subjects, when they had the opportunity and when the consequences were minimal, have chosen play over work. The observed differences of effort would support such an interpretation. This observation, however, should not be a general rule of thumb. People often can and do choose work over play. The decision of what to do first, work vs. play, is dependent on many factors which include what people do at work and what the relative incentives are. Thus, future research on motivation should address the role of appealing distracters in the presence of an intended task.

In terms of how the level of effort affects confidence, the present study appears to support the second hypothesis: subjects who exerted more effort toward the task will be

more confident than subjects who exerted less effort toward the same task. There are a number of reasons as to why people may feel over or under confident about their choices or judgments such as confirmation bias, feedback, having expertise on the subject, framing, etc. Results show that the distracted condition spent less time on the task than the non-distracted condition. This is, however, inconsistent with previous research of Sniezek (1990) showing that greater time and effort exerted by an individual will reduce their subjective uncertainty. The present study supports the idea that if people felt that they have spent a considerable amount of time and effort toward a task, they may feel more confident than they would have felt if they spent less time and effort on the same task. However, this interpretation should not be used as a generalization. This can be explained by a simple scenario: if a biology professor and a history professor had to take a test about cells, the biology professor will probably not spend the same amount of time and effort in studying for the test as the history professor, yet the biology teacher will probably still be more confident than the history professor. In order to predict a person's confidence, it is important to take in account the environment (i.e. distractors), what is brought in the environment (i.e. the skills and abilities of the individuals), and individual differences (i.e.. self-confidence).

Addressing the distracted vs. non-distracted conditions for accuracy, these two groups also did not show any significant difference. Even though the non-distracted condition was more confident, they were no more accurate than the distracted condition. This result is consistent with past research: increased confidence in judgments does not necessarily increase judgment accuracy (Gigerenzer et al., 1992; Sniezek, 1991). Since the distracted subjects did just as well as the non-distracted subjects in terms of accuracy, we can say that the non-distracted subjects were overconfident about their estimates.

Given the significant differences between the distracted and non-distracted conditions, the question remains as to why groups did not outperform individuals. One possible explanation is that the large variances of estimates presents a strong signal that the task was difficult. This may have inhibited further information processing of the subject, who instead resorts to a choice heuristic for problems involving luck rather than skill. Possible heuristics may involve guessing or for a group, taking the mean. Another possibility is apathy or lack of interest. Since subjects had to attend this experiment to fulfill a class requirement, they may have come into the experiment with a negative attitude. Although they may have been capable of making educated estimates, they

probably did not concentrate on the task as much as they would have if they voluntarily signed up for the experiment. In terms of confidence, there were only three times out of twenty-five where groups were significantly more confident than individuals. The possible explanations may be similar as to why there was no significant differences in accuracy for individuals and groups.

In summary, the pattern of results obtained here demonstrates the complexity of the relationship between motivation/effort and confidence. Some studies do investigate these two components in detail, but very few, if any, have addressed the *relationship* between them. In this study, this relationship has been shown to exist. As we have discussed, confidence can be influenced by an endless number of variables. Any one study will necessarily be limited in the number of factors that can be examined. In this study, we have chosen to control effort for the opportunity to understand better the effects it has on confidence. Future endeavors at understanding this relationship may uncover more conditions that cause people to adjust their confidence in a decision making task.

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Table 1

Mean Post Questionnaire Scores That Measure Level of Effort

Dependent Variable: **TIME**

GROUPING	MEAN	N	CONDITION
A	3.00	10	ID
B	7.18	11	IN
C	5.27	51	GD
D	7.84	51	GN

Dependent Variable: **EFFORT**

GROUPING	MEAN	N	CONDITION
A	2.20	10	ID
A	2.40	10	IN
A	2.31	51	GD
B	2.98	51	GN

Dependent Variable: **SEARCH**

GROUPING	MEAN	N	CONDITION
A B	2.40	10	ID
A B	2.45	11	IN
A	2.31	51	GD
B	2.94	51	GN

Dependent Variable: **EACRIME**

GROUPING	MEAN	N	CONDITION
A B	2.80	10	ID
A B	2.91	11	IN
A	2.20	51	GD
B	2.65	51	GN

Dependent Variable: **RATIONAL**

GROUPING	MEAN	N	CONDITION
A B	2.70	10	ID
A B	3.00	10	IN
A	2.53	51	GD
B	3.06	51	GN

Dependent Variable: **RANDOM**

GROUPING	MEAN	N	CONDITION
A B	2.30	10	ID
A B	2.40	10	IN
A	2.38	50	GD
B	1.82	51	GN

Note. ID = Individual/Distracted; IN = Individual/Not Distracted; GD = Group/Distracted; GN = Group/ Not Distracted. Any two groups with a common alphabetical letter are not significantly different $(p < .05)$.

Table 2

Mean Confidence Scores of Questionnaire B

Dependent Variable: **MURDER & ATTEMPTS CONFIDENCE SCORE**

GROUPING	MEAN	N	CONDITION
A	4.56	9	ID
A	4.18	11	IN
A	4.13	16	OD
A	5.71	17	ON

Dependent Variable: **SEXUAL ASSAULTS & ATTEMPTS CONFIDENCE SCORE**

GROUPING		MEAN	N	CONDITION
A	B	4.22	9	ID
A	B	4.91	11	IN
A		4.06	16	OD
	B	5.71	17	ON

Dependent Variable: **ROBBERY CONFIDENCE SCORE**

GROUPING	MEAN	N	CONDITION
A	4.25	8	ID
A	4.45	11	IN
A	4.00	16	OD
A	5.59	17	ON

Dependent Variable: **AGGREGATED BATTERY CONFIDENCE SCORE**

GROUPING		MEAN	N	CONDITION
A		4.22	9	ID
A	B	4.45	11	IN
A		3.94	16	OD
	B	6.12	17	ON

Dependent Variable: **AGGREGATED ASSAULT CONFIDENCE SCORE**

GROUPING		MEAN	N	CONDITION
A	B	3.63	8	ID
A	B	4.73	11	IN
A		3.81	16	OD
	B	5.65	17	ON

Dependent Variable: **BURGLARY: COMMERCIAL CONFIDENCE SCORE**

GROUPING		MEAN	N	CONDITION
A		3.63	8	ID
A	B	4.09	11	IN
A	B	4.25	16	OD
	B	5.71	17	ON

Dependent Variable: **BURGLARY: RESIDENTIAL CONFIDENCE SCORE**

GROUPING		MEAN	N	CONDITION
A		3.50	8	ID
A		4.09	11	IN
A		4.19	16	OD
	B	6.06	16	ON

Dependent Variable:	THEFT: UNDER $300 CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A	3.13	8	ID
A B	4.82	11	IN
A	4.06	16	GD
B	6.56	16	GN

Note. ID = Individual/Distracted; IN = Individual/Not Distracted; GD = Group/Distracted; GN = Group/ Not Distracted. Any two groups with a common alphabetical letter are not significantly different (p < .05).

Table 2a

Mean Confidence Scores of Questionnaire C

Dependent Variable:	MURDER & ATTEMPTS CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A B	4.56	9	ID
A B	4.19	11	IN
A	4.61	49	CD
B	5.55	51	CN

Dependent Variable:	SEXUAL ASSAULTS & ATTEMPTS CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A	4.78	9	ID
A	4.64	11	IN
A	4.68	50	CD
A	5.45	51	CN

Dependent Variable:	ROBBERY CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A	4.33	9	ID
A	4.60	10	IN
A	4.35	51	CD
A	5.14	51	CN

Dependent Variable:	AGGREGATED BATTERY CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A	4.33	9	ID
A B	4.09	11	IN
A	4.46	50	CD
B	5.30	50	CN

Dependent Variable:	AGGREGATED ASSAULT CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A B	4.56	9	ID
A B	5.18	11	IN
A	4.42	50	CD
B	5.45	51	CN

Dependent Variable:	BURGLARY: COMMERCIAL CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A B	4.56	9	ID
A B	4.27	11	IN
A	4.35	51	CD
B	5.29	51	CN

Dependent Variable:	BURGLARY: RESIDENTIAL CONFIDENCE SCORE		
GROUPING	MEAN	N	CONDITION
A B	4.33	9	ID
A	3.82	11	IN
A	4.38	50	CD
B	5.27	51	CN

Dependent Variable: THEFT: UNDER $300 CONFIDENCE SCORE			
GROUPING	MEAN	N	CONDITION
A	4.89	9	ID
A	4.82	11	IN
A	4.80	51	GD
A	5.69	51	GN

Note. ID = Individual/Distracted; IN = Individual/Not Distracted; GD = Group/Distracted; GN = Group/ Not Distracted. Any two groups with a common alphabetical letter are not significantly different (p < .05).

Figure Caption

Figure 1. McGrath's group task circumplex model (McGrath, 1984).

Figure 2. Locke's motivation sequence, hub, and core.

Figure 3. Three contingencies at which judgments occur in the Naylor, Pritchard and Ilgen's theory of motivation: NPI Theory (Naylor et al., 1980).

Figure 4. Mean time (minutes) spent on the decision making task which was Questionnaire B. (Maximum time = 10 minutes).

Figure 5. Mean level of effort subjects believed they put forth on the decision making task (Questionnaire B). (Maximum level of effort = 4).

Figure 6. Mean scores regarding how hard subjects searched for the best possible estimates throughout the experiment. (1 = did not work hard; 4 = worked hard).

Figure 7. Mean scores regarding whether subjects worked on each crime individually. (1 = did not at all; 4 = did so a lot).

Figure 8. Mean scores regarding whether subjects used a rational approach in estimating each crime. (1 = did not use; 4 = used).

Figure 9. Mean scores rearding whether subjects randomly wrote down their estimates. (1 = did not randomly write down estimates; 4 = did randomly write down estimates).

Figure 10. Mean overall confidence scores throughout the experiment. (1 = not at all confident; 9 = very confident).

Figure 11. Mean confidence scores of Questionnaires A, B, and C for the distracted and not distracted conditions. (Questionnaire A was given first, Questionnaire B second, and Questionnaire C was given last).

Figure 12. Mean scores regarding whether subjects enjoyed the experiment. (0 = did not enjoy; 2 = did enjoy).

Figure 1   QUADRANTS, TASK TYPES, AND KEY CONCEPTS OF THE TASK CIRCUMPLEX

___

QUADRANT I: GENERATE

Type 1. *Planning tasks:* Generating plans. E.g.: Hackman's "problem-solving" task type. Key notion: Action-Oriented Plan

Type 2. *Creativity Tasks:* Generating ideas. E.g.: Hackman's "production" tasks; "brainstorming" tasks. Key notion: Creativity.

QUADRANT II: CHOOSE

Type 3. *Intellective Tasks:* Solving problems with a correct answer. E.g.: Laughlin's intellective tasks, with correct answer and compelling answers; logic problems and other problem-solving tasks with correct but not compelling answers; tasks for which expert consensus defines answer. Key notion: Correct answer.

Type 4. *Decision-Making Tasks:* Dealing with tasks for which the preferred or agreed upon answer is the correct one. E.g.: tasks used in risky shift, choice shift, and polarization studies; juries. Key notion: Preferred answer

QUADRANT III: NEGOTIATE

Type 5. *Cognitive Conflict Tasks:* Resolving conflicts of viewpoint (not of interests). E.g.: cognitive conflict tasks used in social judgment theory work; some jury tasks. Key notion: Resolving policy conflicts.

Type 6. *Mixed-Motive Tasks:* Resolving conflicts of motive-interest. E.g.: negotiations and bargaining tasks; mixed-motive dilemma tasks; coalition formation/reward allocation tasks. Key notion: Resolving pay-off conflicts.

QUADRANT IV: EXECUTE

Type 7. *Contests/Battles:* Resolving conflicts of power; competing for victory. E.g.: wars, all winner-take-all conflicts, competitive sports. Key notion: Winning.

Type 8. *Performances:* Psychomotor tasks performed against objective or absolute standards of excellence, e.g., many physical tasks; some sports events. Key notion: Excelling.
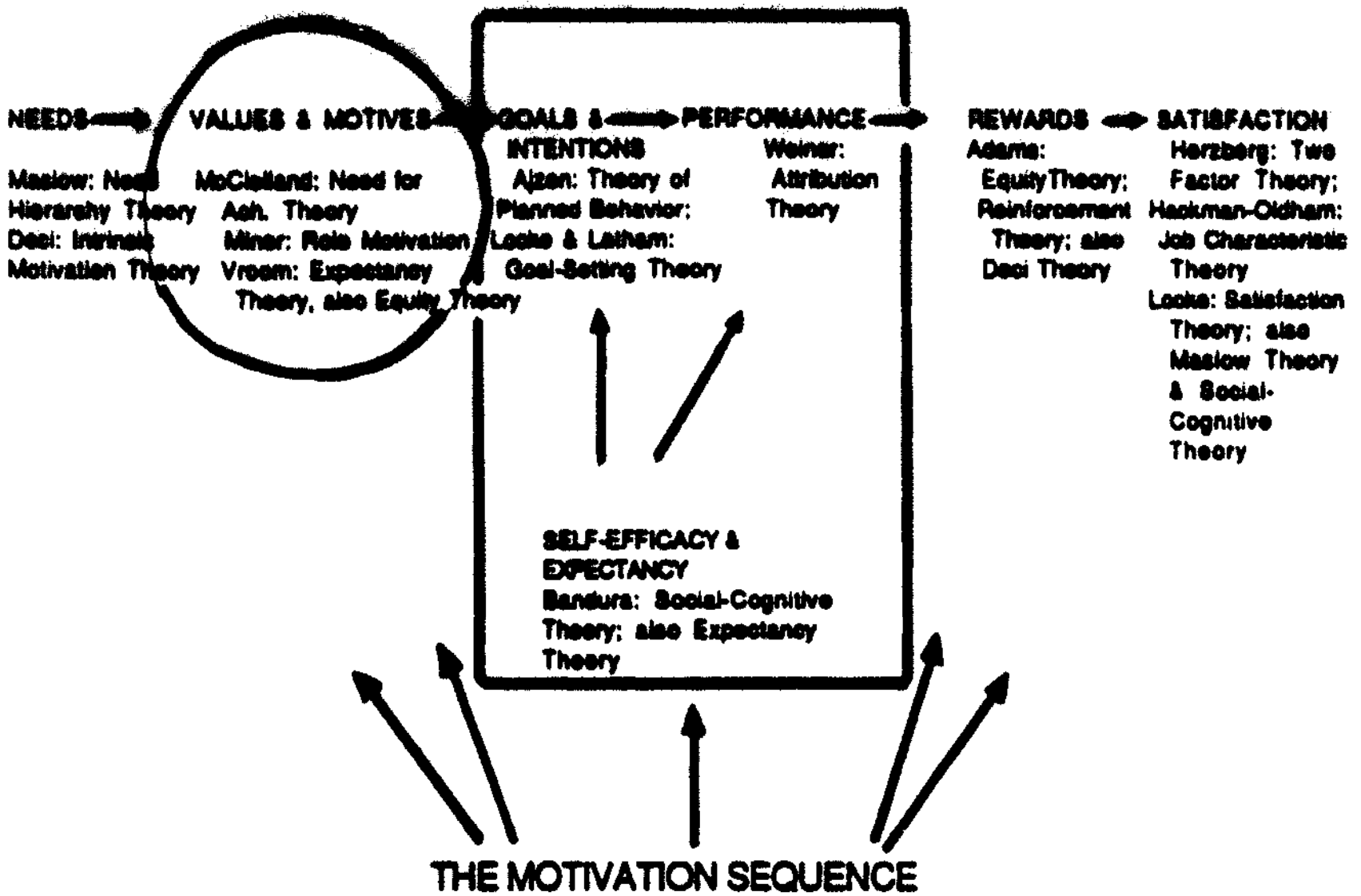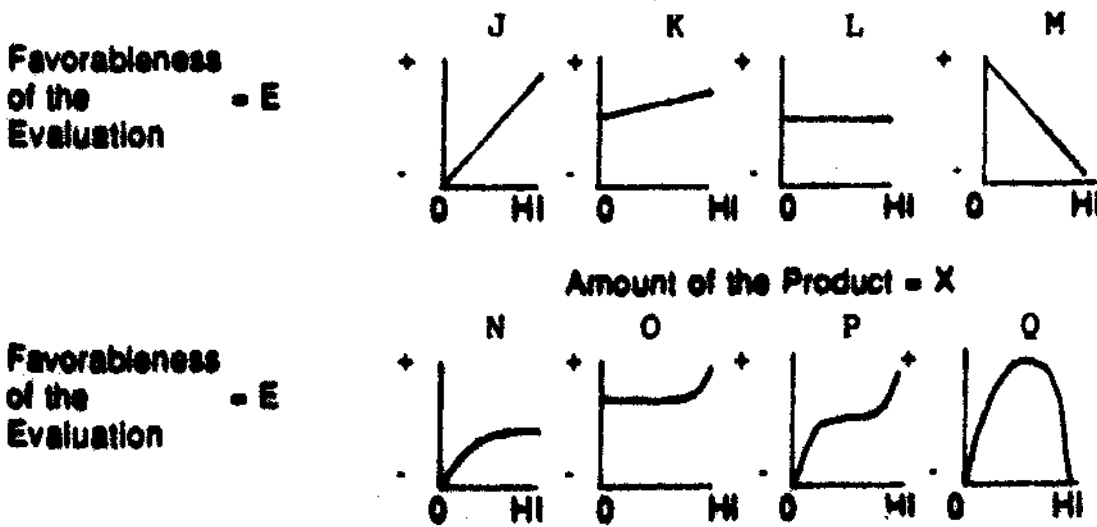
FIGURE 2: MOTIVATION SEQUENCE, HUB, AND CORE

NEEDS ➡ VALUES & MOTIVES ➡ GOALS & ⬅➡ PERFORMANCE ⬅➡ REWARDS ⬅➡ SATISFACTION
                                INTENTIONS   Weiner: Adams: Herzberg: Two
Maslow: Need   McClelland: Need for   Ajzen: Theory of   Attribution   Equity Theory;   Factor Theory;
Hierarchy Theory Ach. Theory   Planned Behavior;   Theory   Reinforcement Hackman-Oldham:
Deci: Intrinsic   Miner: Role Motivation Locke & Latham: Theory; also   Job Characteristic
Motivation Theory Vroom: Expectancy   Goal-Setting Theory   Deci Theory   Theory
                Theory, also Equity Theory   Locke: Satisfaction
                                                                                      Theory; also
                                                                                      Maslow Theory
                                                                                      & Social-
                                                                                      Cognitive
                                                                                      Theory

SELF-EFFICACY &
EXPECTANCY
Bandura: Social-Cognitive
Theory; also Expectancy
Theory

THE MOTIVATION SEQUENCE

FIGURE 3: SOME EXAMPLES OF CONTINGENCY FUNCTIONAL RELATIONSHIPS

1. ACT · TO · PRODUCT RELATIONSHIPS, WHERE X = PRODUCT, C = COMMITMENT, AND X = f(C)

Resources Committed to the Act = C

Resources Committed to the Act = C
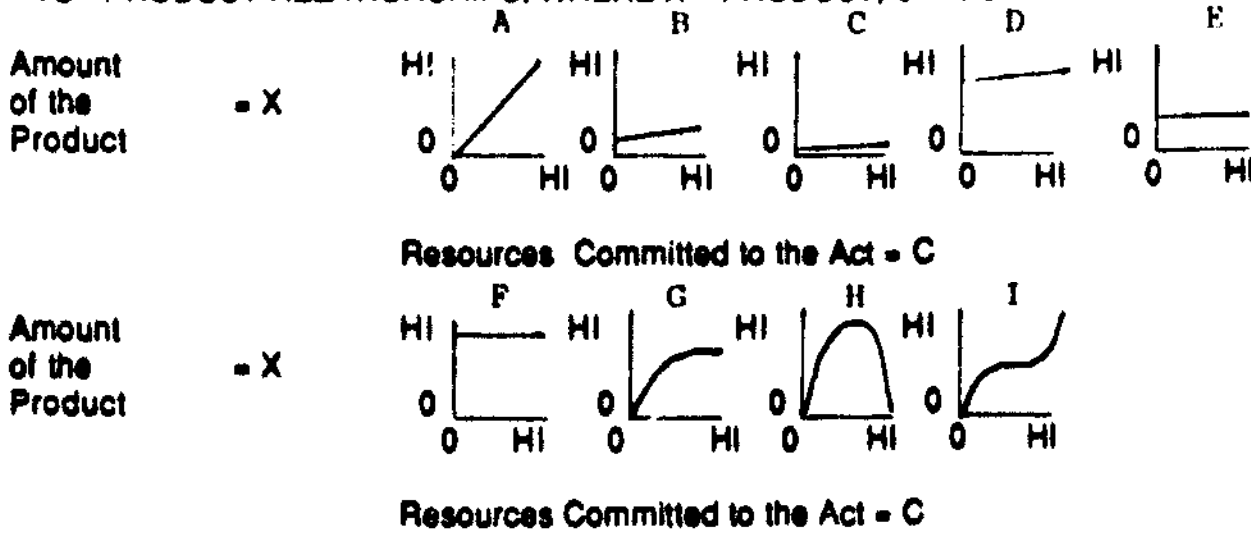
2. PRODUCT · TO · EVALUATION RELATIONSHIPS, WHERE E = EVALUATION, X = PRODUCT, AND E = f(X)

Amount of the Product = X

3. EVALUATION · TO · OUTCOME RELATIONSHIPS, WHERE 0 = OUTCOME, E = EVALUATION, AND 0 = f(E)

Favorableness of the Evaluation = E
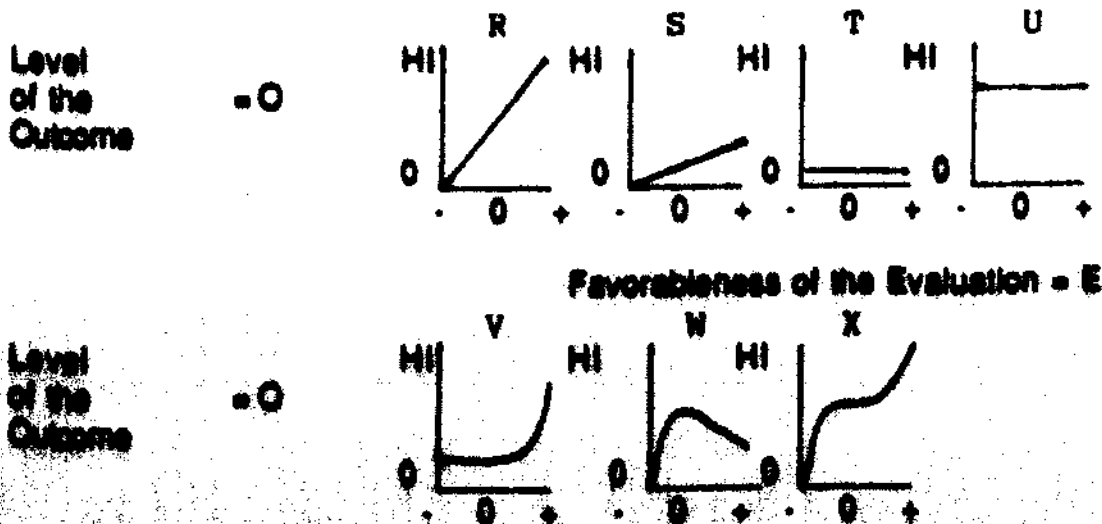
Figure 4   TIME SPENT ON QUESTIONNAIRE B
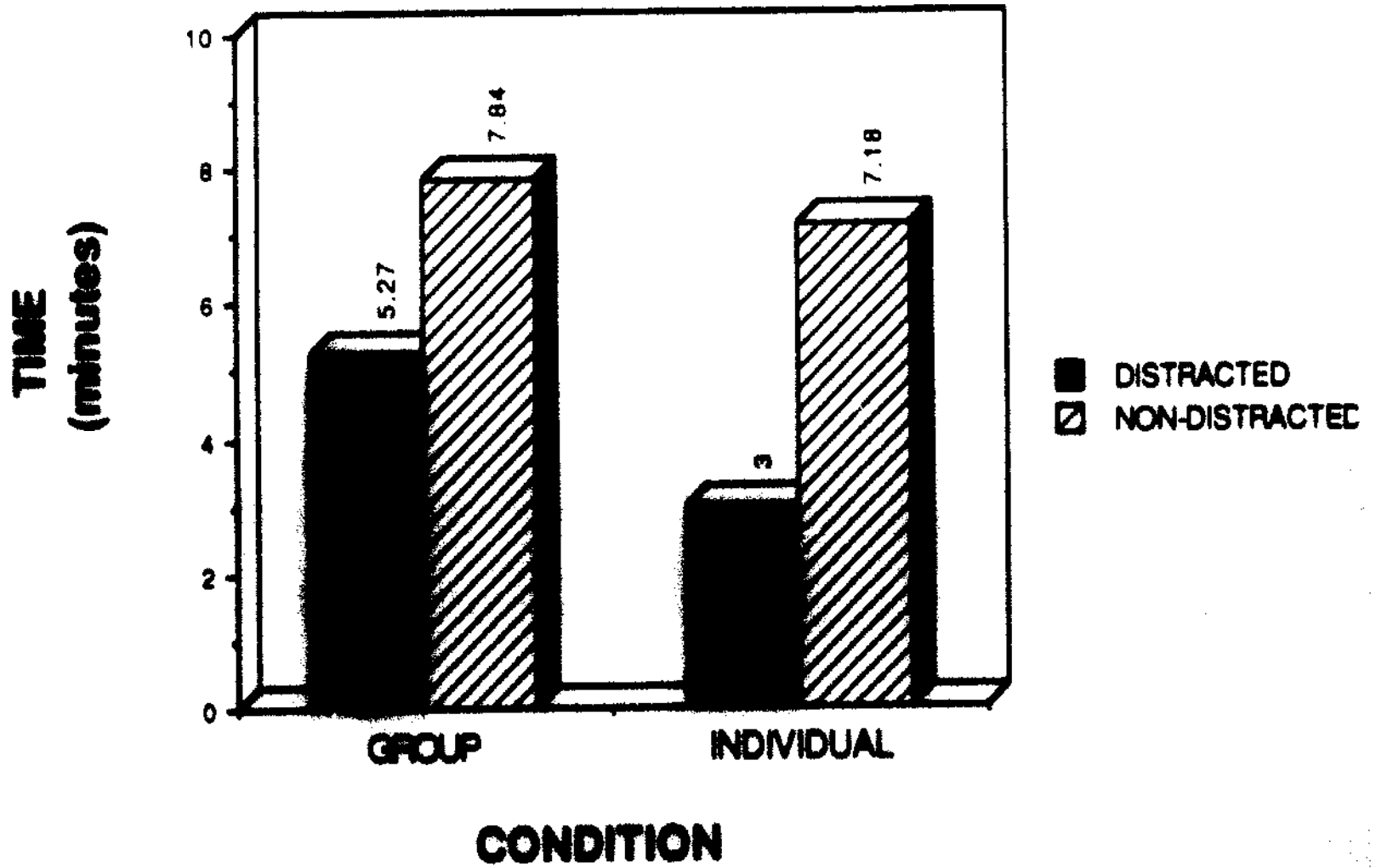
Figure 5   **EFFORT**
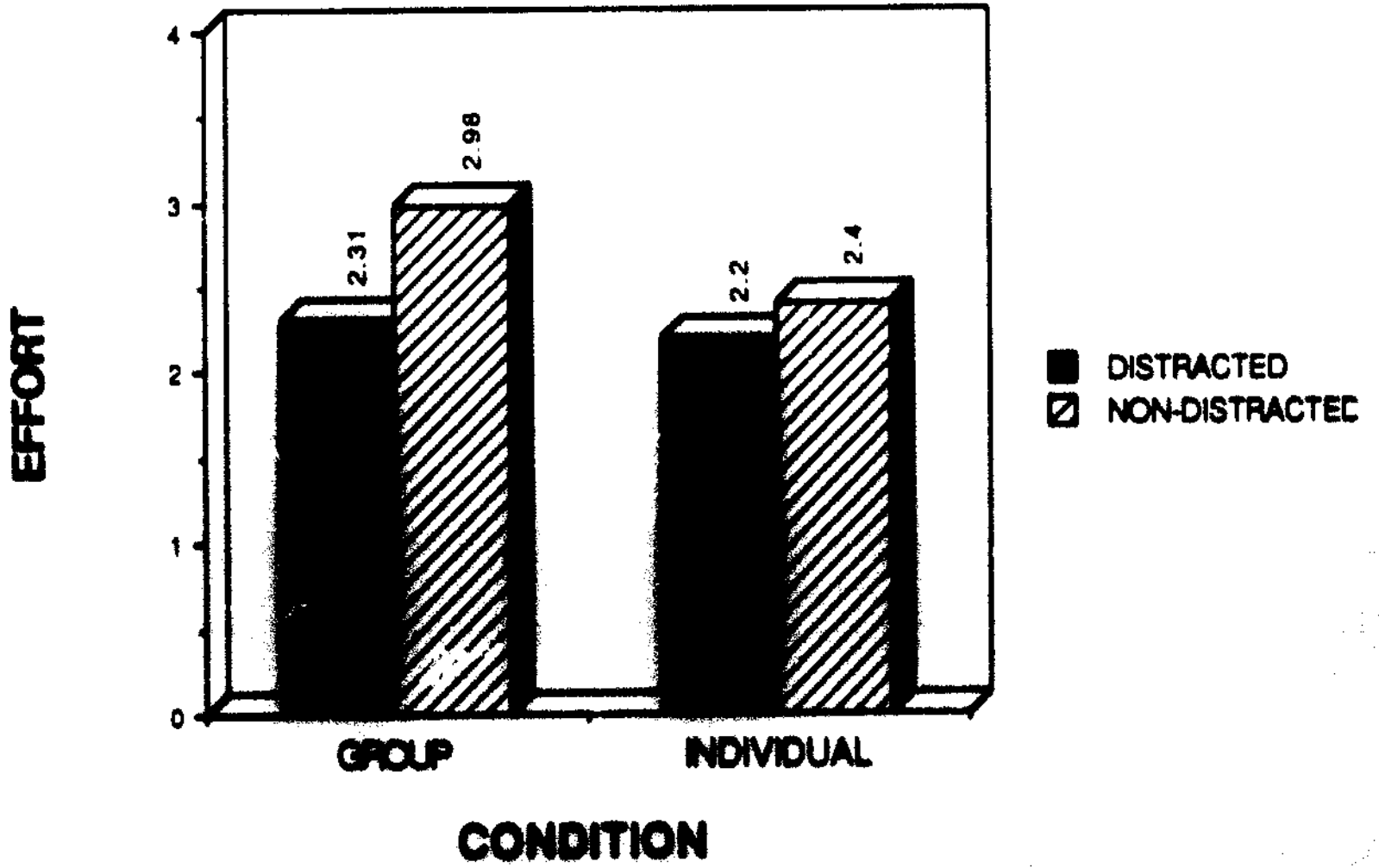
Figure 6   SEARCH
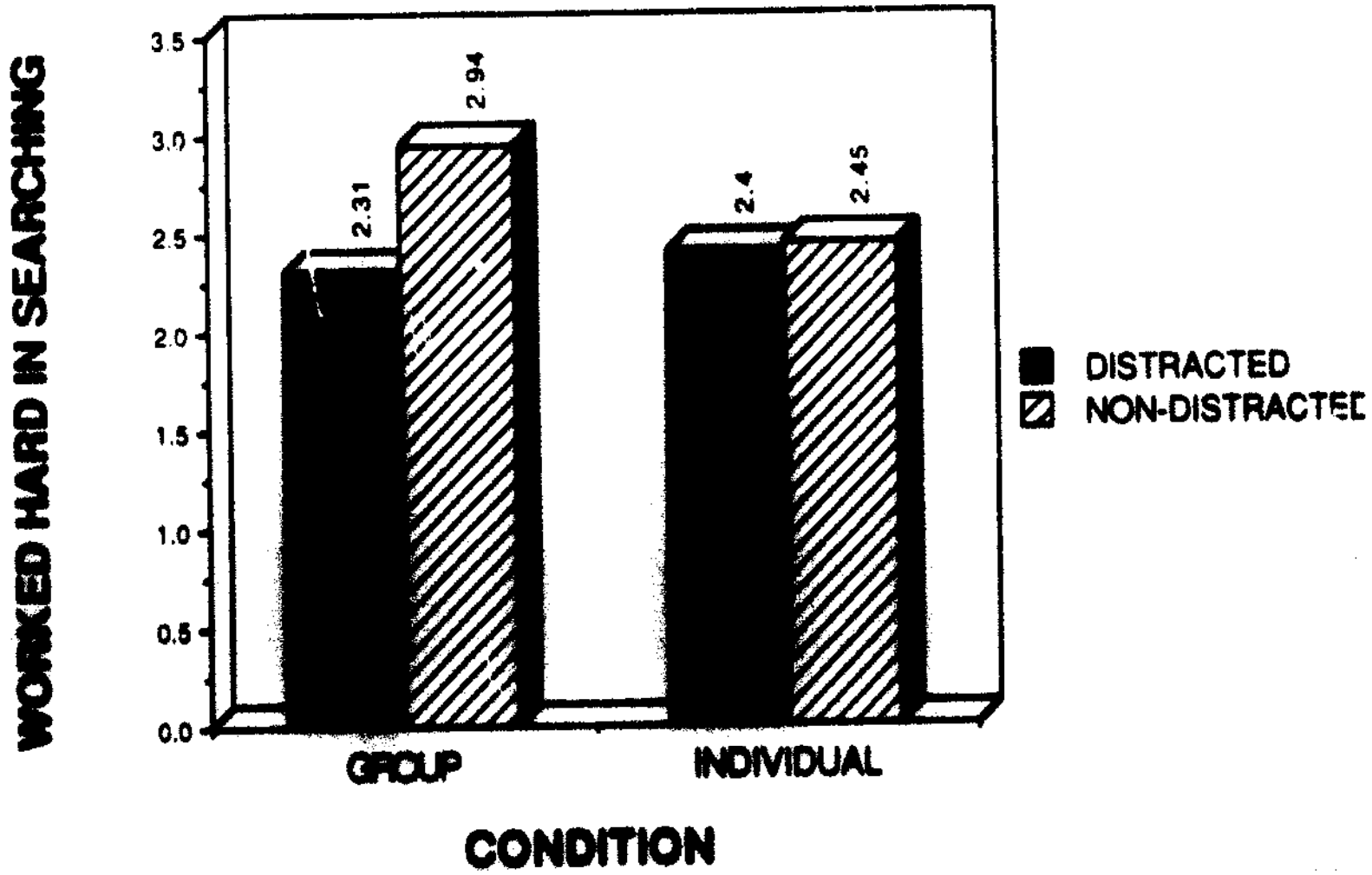
Figure 7   EACH CRIME
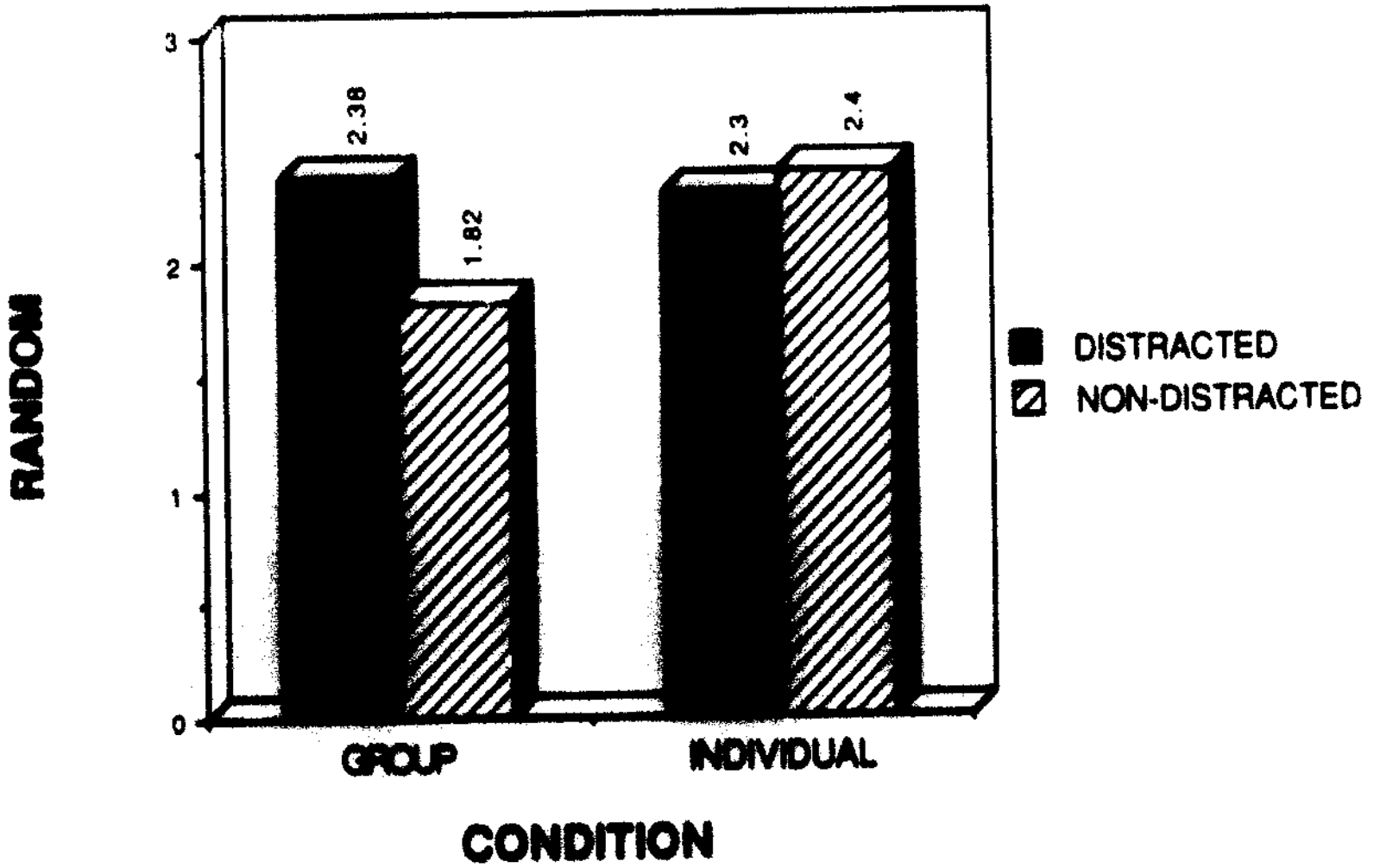
Figure 8   **RATIONAL**

Figure 9   RANDOM

FIGURE 10   OVERALL CONFIDENCE
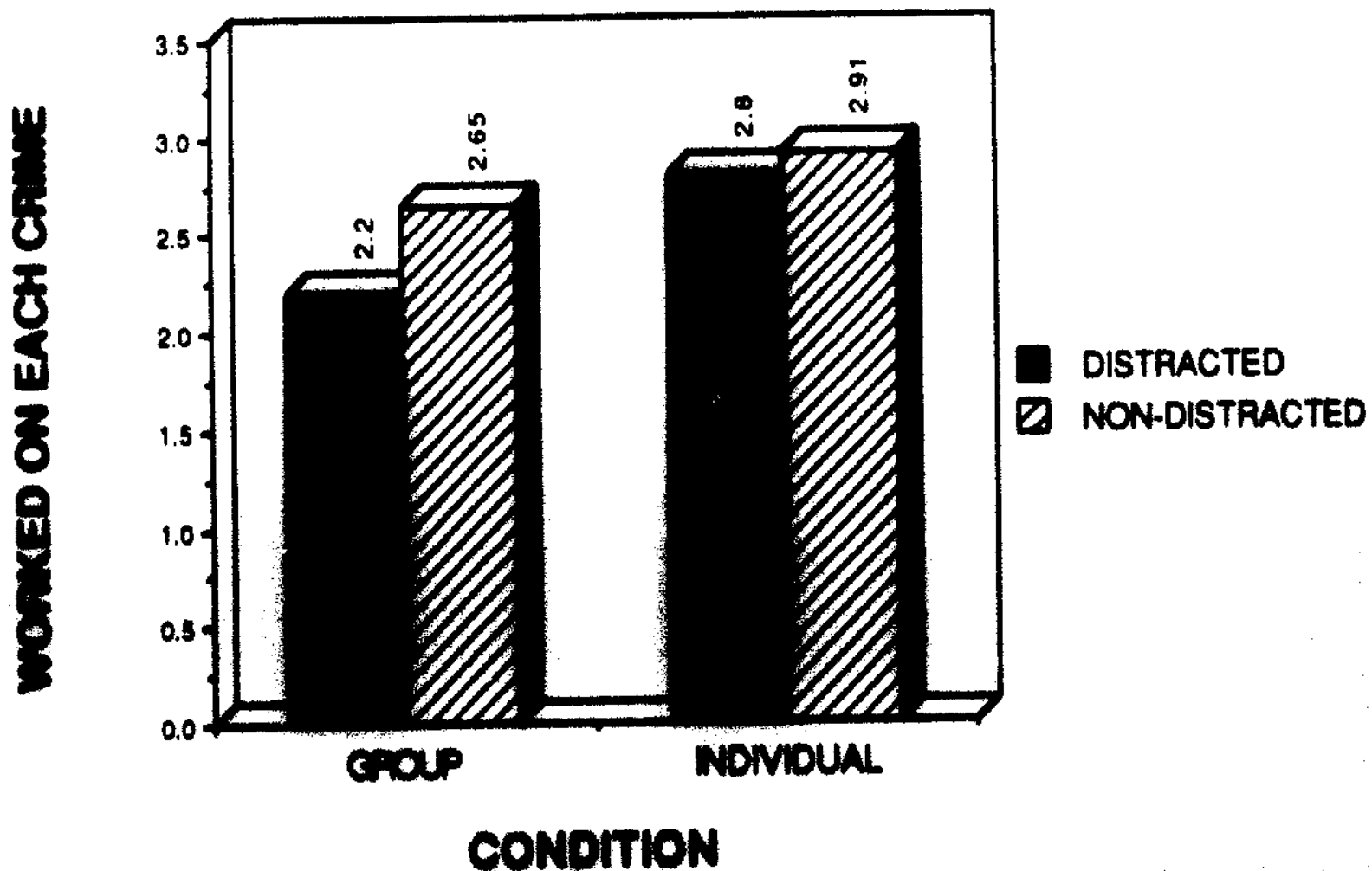
Figure 11   **MEAN CONFIDENCE RATINGS**

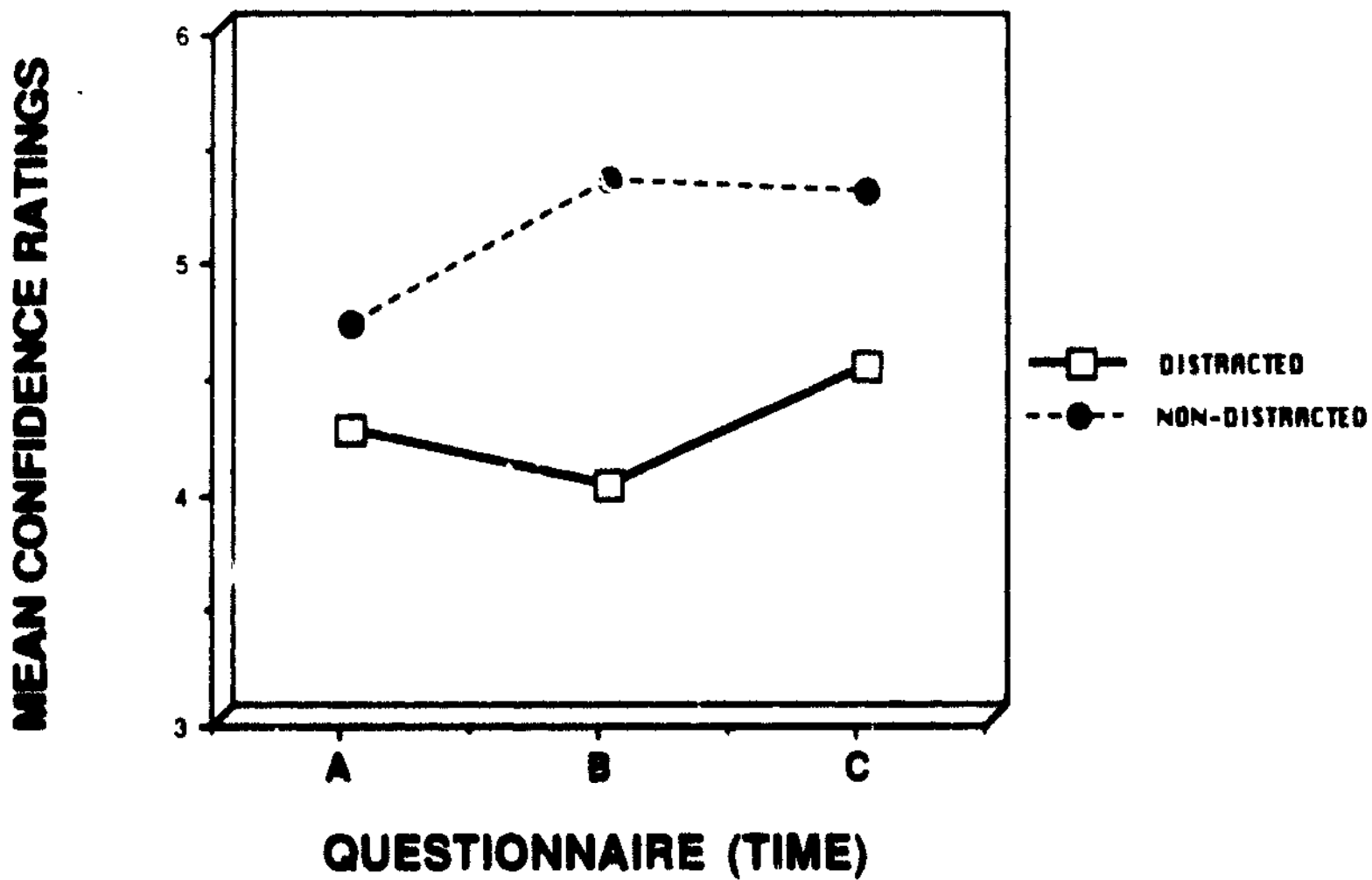MEAN CONFIDENCE RATINGS
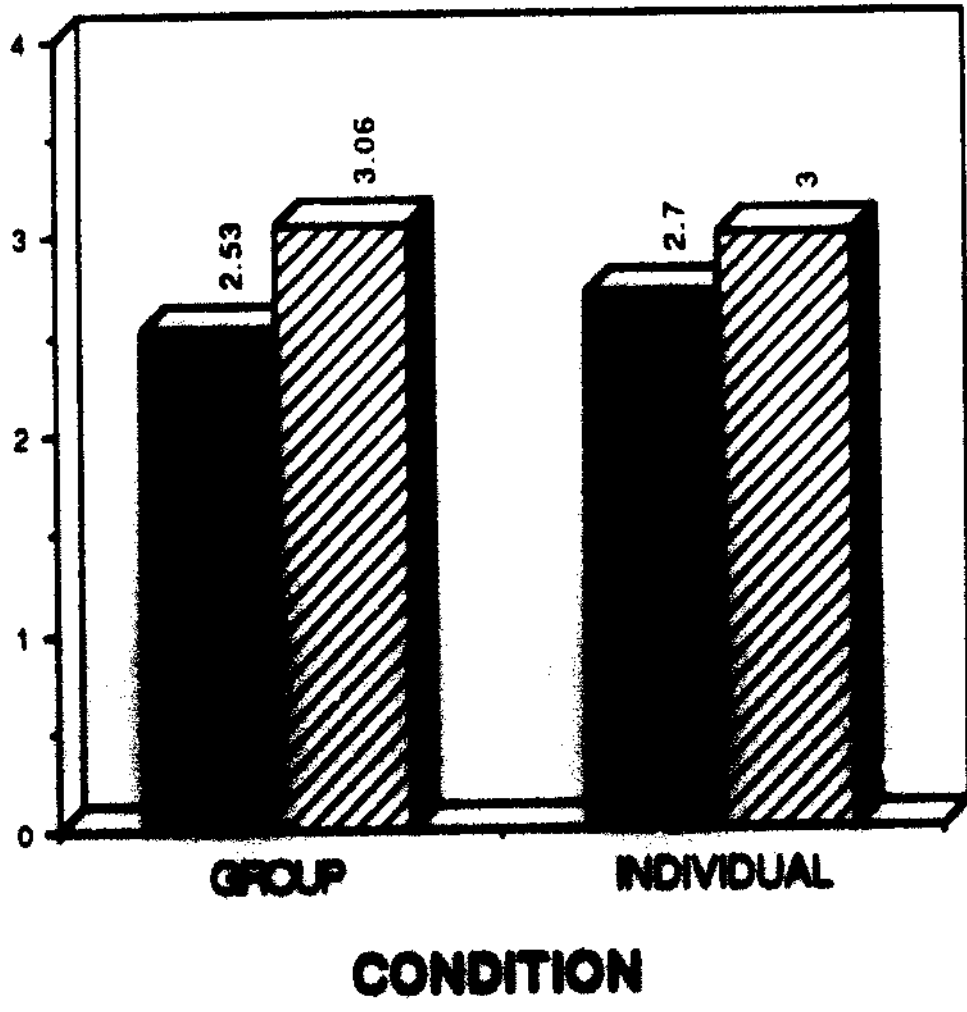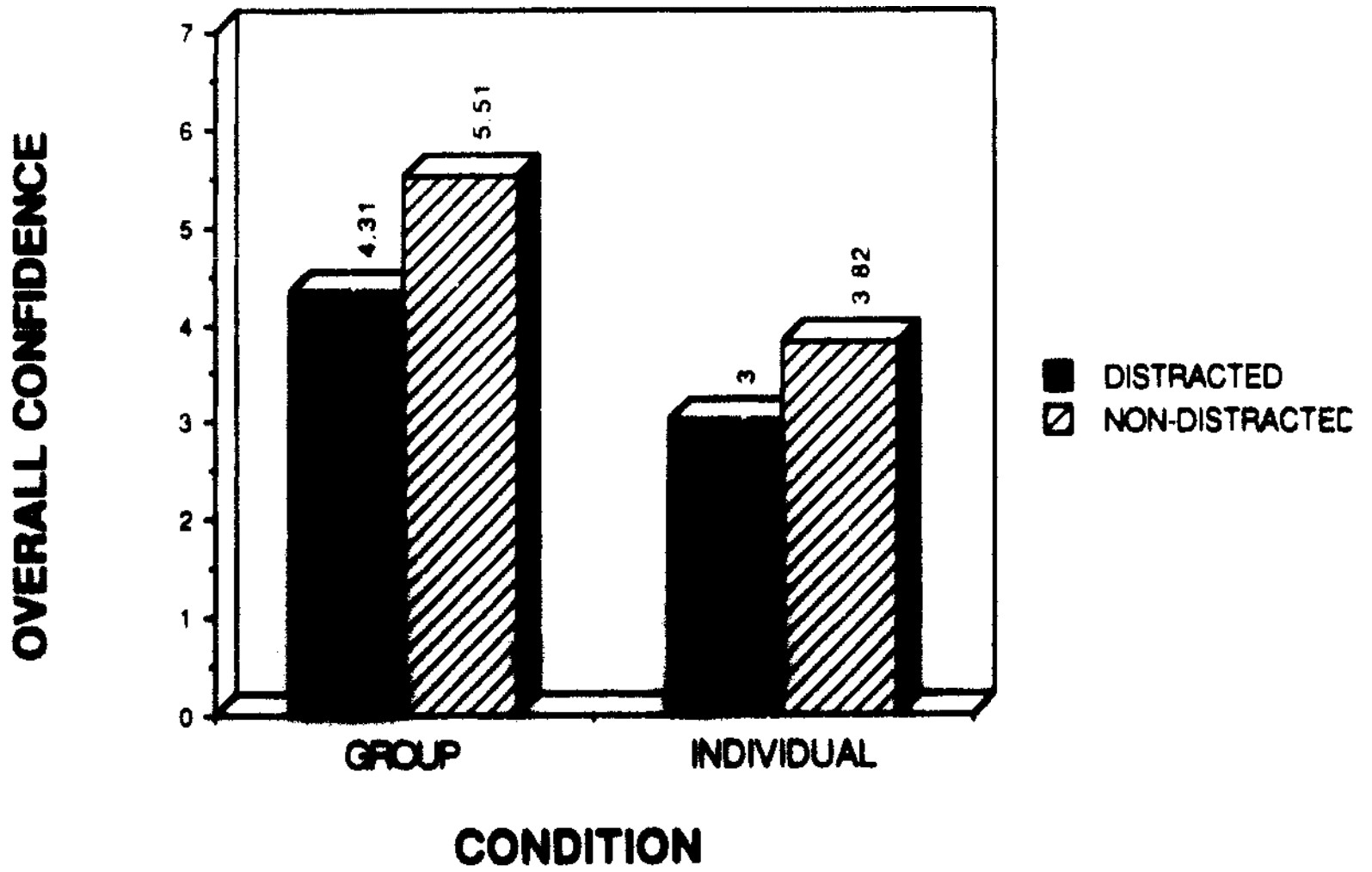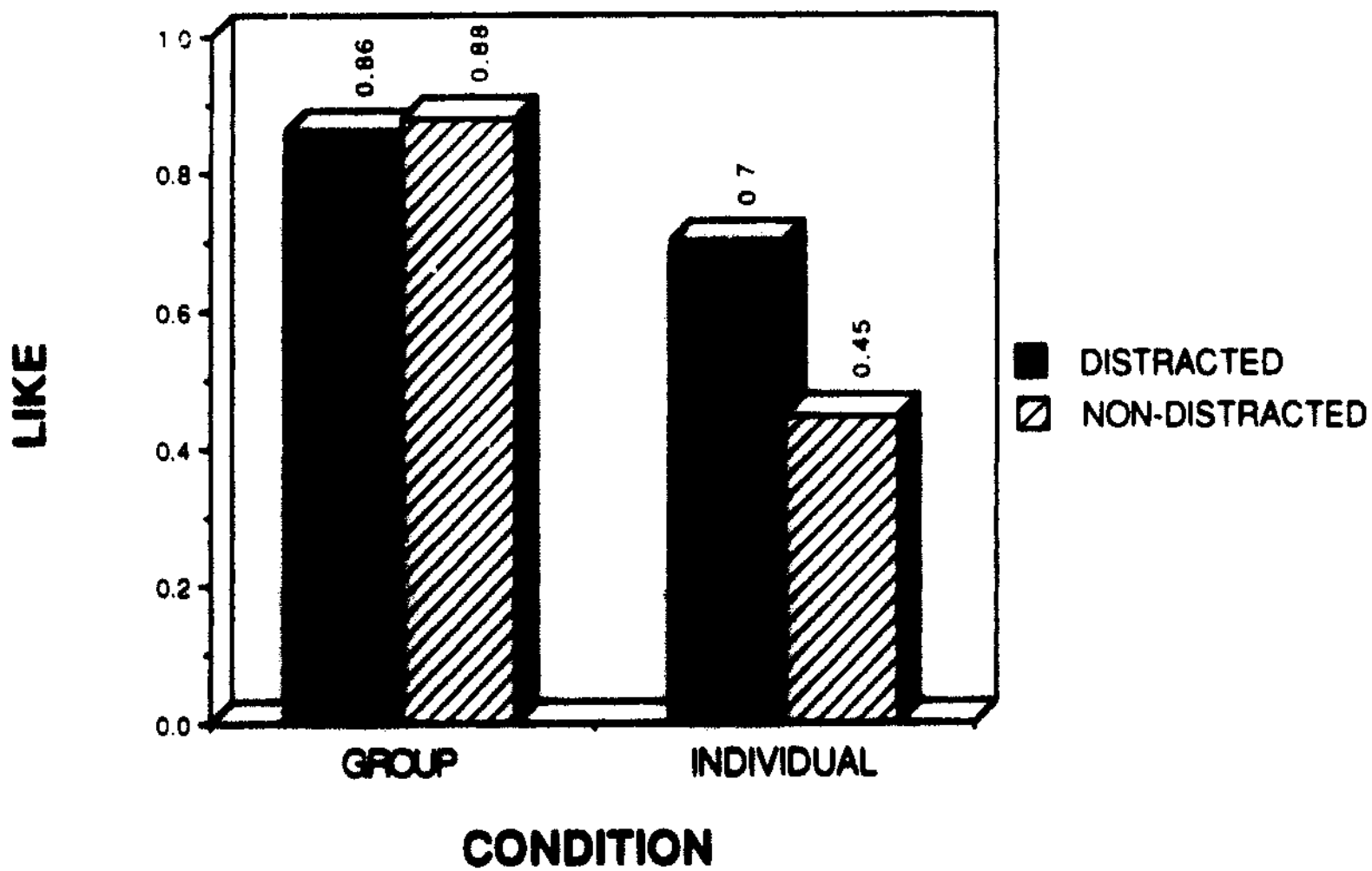
DISTRACTED

NON-DISTRACTED

QUESTIONNAIRE (TIME)

Figure 12   ENJOYMENT OF EXPERIMENT

GENERAL INSTRUCTIONS

CONDITION 2: GROUP/NON-DISTRACTED

GENERAL INSTRUCTIONS

In your packet you will find the following: a consent form, two questionnaires labeled A and B, and a pen. Please make sure you have all of these items. If you are missing any of them, inform the experimenter at this time.

These are the general instructions for this experiment. Read them thoroughly and further instructions will be given later.

STEP 1: Read carefully and sign the consent form.

STEP 2: Fill out questionnaire A individually.

STEP 3: After completing questionnaire A, you will form groups of three which will be determined by the color of your poker chip. Red chips will go to room one, blue chips to room two, yellow chips to room three, and green chips to room four. When you are in you group and in your assigned room, there will be a questionnaire on the table for your group to answer. One group answer sheet is provided. This is the same questionnaire as questionnaire A but you will be answering it as a group. You will answer the questions to the best of your group's knowledge. **YOUR GROUP CAN ONLY SPEND 10 MINUTES WORKING ON THE QUESTIONNAIRE.** After the ten minutes, the experimenter will then collect your group's answer sheet.

STEP 4: The experimenter will tell you when to start questionnaire B. You will answer this individually.

ONCE YOU HAVE READ THESE INSTRUCTIONS, PLEASE START STEP 1

CONDITION 3: INDIVIDUAL/NON-DISTRACTED

GENERAL INSTRUCTIONS

In your packet you will find the following: a consent form, two questionnaires labeled A and C, and a pen. Please make sure you have all of these items. If you are missing any of them, inform the experimenter at this time.

These are the general instructions for this experiment. Read them thoroughly and further instructions will be given later.

STEP 1: Read carefully and sign the consent form.

STEP 2: Fill out questionnaire A individually.

STEP 3: After completing questionnaire A, you will work on questionnaire B which the experimenter will give to you later. The experimenter will then assign you to a room. **YOU MUST SPEND 10 MINUTES WORKING ON THIS TASK.** After the 10 minutes, the experimenter will collect your questionnaire.

STEP 4: The experimenter will tell you when to start questionnaire C.

ONCE YOU HAVE READ THESE INSTRUCTIONS, PLEASE START STEP 1

CONDITION 4: INDIVIDUAL/DISTRACTED

GENERAL INSTRUCTIONS

In your packet you will find the following: a consent form, two questionnaires labeled A and C, and a pen. Please make sure you have all of these items. If you are missing any of them, inform the experimenter at this time.

These are the general instructions for this experiment. Read them thoroughly and further instructions will be given later.

STEP 1: Read carefully and sign the consent form.

STEP 2: Fill out questionnaire A individually.

STEP 3: After completing questionnaire A, you will work on questionnaire B which the experimenter will give to you later. The experimenter will then assign you to a room. You will have only 10 minutes to complete questionnaire B. **YOU CAN USE THIS TIME HOWEVER YOU WANT TO.** After the 10 minutes, the experimenter will collect your questionnaire.

STEP 4: The experimenter will tell you when to start questionnaire C.

ONCE YOU HAVE READ THESE INSTRUCTIONS, PLEASE START STEP 1

APPENDIX B

MURDER & ATTEMPTS

Definition: A wrongful death of a person.

1. According to the information given, how many murder and murder attempts will be committed in December 1992?

My single best ESTIMATE is _____.
There is a 90% chance that the actual value lies between _____ and _____.

My confidence in the accuracy of my ESTIMATE is:

(Circle one number on the scale)

1....2....3....4....5....6....7....8....9

not at all   somewhat   very
confident   confident   confident