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Effects of process vs. outcome accountability, responsibility, and indentifiability on solution quality

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EFFECTS OF PROCESS VS. OUTCOME ACCOUNTABILITY, RESPONSIBILITY, AND IDENTIFIABILITY ON SOLUTION QUALITY

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This study investigated the effect of accountability, responsibility, and identifiability on the quality of solutions generated to an ill-defined problem. Accountable participants provided written justification for their output, either the solution generation process (process accountability) or the solution generation outcome (outcome accountability). Participants perceived themselves as either sharing responsibility for solution generation with others (shared responsibility) or solely responsible for solution generation (sole responsibility). Lastly, participants were either identifiable, such that their responses could be traced to them personally, or anonymous. Solution quality was measured by resolving power, or the degree to which a solution resolves conflicting aspects of the problem. All participants were asked to read an ill-defined problem, generate as many solutions as possible to the problem, and choose the solution they felt was best. No predictions were supported and a number of unexpected findings occurred. Unaccountable and outcome accountability participants each generated higher quality best solutions than participants in the process accountability conditions. Participants who shared responsibility generated a higher number of resolving alternatives and a greater proportion of resolving alternatives than participants who were solely responsible for solution generation. Lastly, an interaction between identifiability and accountability was

discovered for the proportion of resolving alternatives. Post-hoc comparisons revealed that highly identifiable but unaccountable participants generated a higher proportion of resolving solutions than highly identifiable participants in either outcome or process accountability conditions. Implications for individual and group problem solving and suggestions for future research are discussed.

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Discussion

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Overview of the Problem

In every day life and in organizational contexts, people are faced with the task of solving problems, many of which are accompanied by uncertainty and hesitation because they have no one correct answer. These types of problems can be labeled as "ill-defined" because it is often not perfectly clear exactly what the problem is or what routes or measures should be taken to arrive at high quality solutions (Abelson & Levi, 1985). Much research has been devoted to this common problem and has attempted to determine how to maximize the quality of the final decision for ill-defined problems. This line of research has taken several approaches to achieving this goal by focusing on the different stages or phases of the problem solving process that individuals go through to arrive at a final solution. A review by Abelson and Levi (1985) describes four basic stages of ill-defined problem solving as problem recognition, alternative generation, alternative evaluation, and alternative selection. Essentially, these steps involve identifying the existence of a problem, generating possible solutions or alternatives, evaluating these solutions, and ultimately choosing the solution which is perceived to be the best alternative and implementing it. Research by Herek, Janis, and Huth (1987) has demonstrated the importance and benefit of focusing attention on each of these stages. Herek et al. determined that high quality decision making procedures are often associated with better outcomes. Their analysis of 19 international crises led to the suggestion that vigilant problem solvers who carefully attend to the appropriate steps will more likely (although

not always) end up with a better outcome. However, despite the importance of the quality of all phases, little research has focused on the solution generation phase of the problem solving process for ill defined problems. It is important that this stage be addressed because lack of attention to this stage or any other is likely to cause the overall decision quality to suffer.

Several approaches have been used to identify important influences on solution generation. One approach has attempted to identify stable qualities of problem solvers that influence solution generation. This individual difference perspective has primarily focused on individual qualities, such as expertise, that affect a person's ability to generate high quality solutions. For example, it has been shown that individuals who are considered experts in a given domain tend to be better at developing good solutions for problems in that domain (Butler, 1995).

Another research approach has aimed at improving the problem solver's ability to generate solutions by providing them with decision aids. Problem structuring techniques are decision aids which attempt to guide the development of better solutions. For example, Pitz, Sachs, and Heerboth (1980) found that structuring a problem by having participants generate solutions to problem objectives presented one at a time led to a higher quantity of solutions generated (compared to structuring the problem by presenting all objectives simultaneously, presenting examples of solutions, or providing no structure). Scherer and Billings (1986) further revealed that the way in which problem objectives are presented (e.g., in conflicting pairs, congruent pairs, or individually) can influence the quality of

solutions generated. It should be noted that the goal of the above approaches focuses on the problem solver's *ability* to generate solutions.

Another perspective for understanding and predicting solution generation emphasizes a problem solving motivation or willingness to work hard at coming up with good solutions. There may be individual differences in such motivation, such as need for cognition, for example. Some individuals prefer to engage in complex thinking, whereas others would prefer to engage in tasks which require little thought (Cacioppo & Petty, 1981). It is also possible that motivators outside of the individual can function to increase an individual's willingness to exert effort. For example, individuals working on a very important problem or decision for which they are responsible and accountable may feel motivated to work harder. The assumption is that increased motivation will lead to increased effort, which will ultimately lead to more high quality solutions.

It should be noted that none of the above means of improving problem solving is necessarily better than another. Furthermore, they should not be thought of as entirely independent of one another, as it would be possible to use them in conjunction with one another. However, motivational influences on effort can be used for all individuals and for all types of problems. For example, they do not require knowledge of the particular objectives of the problem and can therefore be applied in a multitude of situations.

A host of variables has been suggested to influence cognitive effort, including decision significance, irreversibility, and consequentiality. In addition, making the decision maker or problem solver identifiable, accountable, or responsible has been shown to affect cognitive effort. Early research by McAllister, Mitchell, and Beach (1979) showed that

when decisions are significant and cannot be reversed, and when the decision maker is responsible for his actions, greater effort is invested in the decision. This increased effort results in the use of more analytic decision strategies. Hagafors and Brehmer (1983) found that having to justify a judgment can lead to greater consistency in judgment policy. Weldon and Gargano (1988) also found that people who were accountable, or expected to justify their judgments, and solely responsible for their responses used more complex judgment strategies. Past research has shown that when individual efforts are identifiable, this identifiability leads to an increase in various types of efforts (Latane, Williams, & Harkins, 1979; Williams, Harkins, & Latane, 1981), but only one has been within the problem solution generation domain. Scherer (1985) showed that people whose responses were identifiable tended to generate more high quality solutions than those whose responses were not identifiable.

For all of the above motivational influences, there is a common goal to increase the willingness of individuals to exert more effort, presumably in order to improve performance. However, much of the effects of accountability, responsibility, and identifiability as motivational influences have been obscured because of the lack of consistency and clarity with which the research has been conducted.

While neither label is necessarily more correct, accountability and responsibility have sometimes been used interchangeably in the literature, and their operationalization often varies from study to study. With respect to accountability, common language tends to define it as liability or responsibility (McKechnie, 1983). However, the bulk of empirical work on this variable has tended to refer to it as having to provide as account for, or

justify, one's views or actions (Tetlock, 1985b). Research on the effects of this definition of accountability on impression formation tasks, expression of opinions or attitudes, and various judgments and decision tasks has shown evidence of both its enhancing and debilitating effects. These effects often depend on the task, the person to whom the individual is accountable, and other situation characteristics. Essentially, the effects of being accountable, or having to justify one's views, are not clear cut or straight forward.

Other research has operationalized accountability in a manner which is somewhat more consistent with every day use of the term. This research has manipulated accountability by making participants solely responsible for their decisions, versus sharing responsibility for decisions with others. This type of manipulation is obviously different from requiring participants to justify their responses to another individual. One can imagine the processes as being somewhat different in nature because accountability with justification implies being able to defend a decision, whereas responsibility implies an additional component of ownership of outcomes. In fact, this same manipulation, involving the assignment of sole versus shared responsibility, is often the procedure used in studies of the effects of responsibility. In situations involving this type of manipulation, the degree of perceived ownership of outcomes is likely to be reduced when responsibility is shared among individuals. In this way, it serves as a useful means of varying responsibility. However, another important component of responsibility is the importance of the outcomes to the individual and to others. In order to induce a heightened sense of responsibility, it is important that the decision task, the decision outcomes, and the consequences of the outcomes be important to the decision maker. Whereas it might be

argued that decision significance and consequentiality are factors independent of responsibility, it is argued here that in real life decisions, these factors are often consistent with and determinants of the degree of responsibility an individual tends to perceive. It is therefore important that the operationalization of responsibility involve a problem or decision whose consequences are perceived as both real and important to the individual.

In addition to the definitional and operational inconsistencies found in the study of accountability and responsibility, both variables have often been confounded with identifiability, which is known to have its own effects, independent of accountability and responsibility. Participants who are not accountable or share responsibility are often unidentifiable, making conclusions regarding the independent effects of any of these variables difficult to draw. In sum, the inconsistency in research on accountability, responsibility, and identifiability makes it difficult to determine a clear pattern of results. Furthermore, with the exception of Scherer's (1985) previously mentioned identifiability study, no studies have examined the effects of these motivational influences on the solution generation stage for ill-defined problems. It is for these reasons that the primary goal of this study was to examine the effects of accountability, responsibility, and identifiability on the generation of solutions to ill-defined problems.

A second problem appears to be inherent to past research on accountability. In most cases, participants have been only vaguely informed of exactly what they are accountable for, or exactly what they will have to justify. They are never told exactly what the researcher is measuring. Whereas it is often the case that informing participants about what will be measured will defeat the purpose of the study, this may not always be the

case for accountability. Participants must be clear about what they will have to justify. Consider a real life situation in which better performance of a particular task is desired. If accountability were the chosen means of improving such performance, one would make the performer accountable for the specific performance level that is desired. In other words, the desired result should be quite clear, and that is what the performer should be accountable for. Consider a more specific example in which higher quality solutions to ill-defined problems are desired. In order to use accountability to enhance such performance, the problem solver should be made accountable specifically for higher quality solutions.

In some cases, however, making individuals accountable simply for the end product is not the best means to arrive at an improved end product. Many times it is the process by which one arrives at the end product which is most important. In these cases, accountability must be directed toward the process itself. The importance of process in problem solving is evidenced by the previously mentioned benefits of problem structuring (Pitz et al., 1980; Scherer & Billings, 1986). When attention was directed to the problem solving process through problem structuring, the outcome was more high quality solutions. Research by Herek et al.(1987) has also shown a relationship between high quality decision making procedures and favorable outcomes. They found that when outcomes were not favorable, they were associated with incomplete use of available information. So whereas one part of the process, information search, was satisfactory, another part of the process, information utilization, was inadequate. Although causal conclusions cannot be made from this study, the results do suggest that poor problem solving procedures may lead to poor outcomes in some cases. Given these studies which

support a relationship between process and outcome for problem solving, it appears that motivational attempts to enhance the process may ultimately enhance the outcomes which follow. It was therefore a secondary goal of this study to examine the influence of accountability for the process versus accountability for the outcome on solution generation for ill-defined problems.

The discussion which follows begins with a review of the one other study which has thus far also recognized a potential distinction between process accountability and outcome accountability. Subsequent discussion will review the literature on accountability studies in which participants were accountable for some type of outcome or end result. These participants were not accountable for any of the processes by which they arrived at the outcomes, but only for the outcomes, which tended to vary from study to study. The review will address the formation of impressions, the expression of opinions and attitudes, and a variety of judgments and decisions. Next, a similar format will be followed in addressing research reflecting the effects of accountability for a process. It is important to note that with the exception of the first study mentioned above, past research has not specifically addressed process versus outcome accountability. However, research has differed in the extent to which the instructions lend themselves to a process interpretation or to an outcome interpretation. Therefore, although most past research has *not* made any mention of a distinction between the two types of accountability, one will be made here.

In the one study that has thus far indicated the existence of at least two types of accountability, procedural and outcome accountability, Siegal-Jacobs and Yates (1996) had participants make a probability judgment regarding the likelihood that an individual

held a particular attitude, based on background information about the individual. Some of the background information was in fact predictive, whereas some was not. Participants were assigned to one of three accountability conditions: procedural, outcome, or no accountability. Participants in the procedural accountability condition were told that an interview would later be conducted to determine why and how certain information was used to arrive at a probability judgment. Outcome accountability participants were told that they would later be given feedback regarding the accuracy of their judgment (true values were known) and that the top five performers would receive a bonus prize for accuracy. Lastly, unaccountable participants were told that their answers would be anonymous and confidential. Multiple detailed dependent measures were assessed to examine probability judgment accuracy. Only those that are relevant to the study's results will be addressed.

The authors hypothesized that procedural accountability would have more beneficial effects on judgment performance than outcome accountability because there is less pressure and stress associated with simply having to arrive at a justifiable procedure, versus having to arrive at a justifiable outcome, the quality of which may often vary due to various uncertainties. Results showed that procedure accountability participants had higher calibration, which means that they gave judgments that most closely resembled the true probability, relative to outcome accountability and unaccountable participants. In addition, they also had lower discrimination, meaning that they tended to attempt to use the nonpredictive information as well as the predictive information in making their judgments. Lastly, outcome accountability was shown to have only negative effects,

compared not only to procedural accountability but also to no accountability. Outcome accountability resulted in greater scatter, an indication of the extent to which judgments vary around their conditional means.

The authors suggested that outcome accountability may have produced more stress, which then resulted in more inconsistent response patterns. Their results show that accountability directed at the procedure can have beneficial effects, while accountability for an outcome may have detrimental or negligible effects. More importantly, Siegal-Jacobs and Yates concluded that it is necessary that attention be drawn to the nature of the accountability instructions and what participants are being held accountable for.

It is extremely important to note that although this study provides considerable support for the notion that a distinction ought to be made between procedural and outcome accountability, the operationalization of these two types of accountability is not entirely consistent with those used in the current study. Although the procedural accountability is similar to that used here, the outcome accountability is very different. It seems that Siegal-Jacobs and Yates' operationalization of outcome accountability more closely resembles that of the consequentiality of the judgment, an outcome which, as the authors have pointed out, is likely to be very uncertain, since participants may have little or no control over it. This study did not intend to examine outcome accountability in conjunction with any of the consequences which follow. Instead, the overall distinction between process and outcome accountability is yet more refined, and the study addresses the difference between being accountable simply for arriving at a good problem solution (outcome accountability) and being accountable for the process used to arrive at a good

problem solution (process accountability). Whereas this refined distinction may not be applicable in all types of situations where accountability is likely to be imposed, it is believed to be particularly applicable to the problem solving domain, where attention to the process of problem solving is likely to enhance the quality of the outcome.

Outcome Accountability

In the following studies, participants were made accountable for the responses they gave concerning their impressions of other individuals, their opinions and attitudes toward controversial issues, and their judgments or decisions. Participants were not asked to be able to explain which information they used to arrive at their responses, only that they be able to describe why the solutions were good solutions.

Impression formation. In one of his earlier studies, Tetlock (1983b) examined the influence of accountability on the perseverance of first impressions of a fictitious defendant's guilt or innocence. Accountability was manipulated by informing participants that they would either have to justify their impressions of the accused person's guilt or innocence to an associate of the experimenter or not. Previous research had shown the tendency for initial impressions to strongly influence the interpretation of later information and subsequent impressions; this is known as the primacy effect. The study was conducted to determine whether accountability would cause participants to be less susceptible to the primacy effect. Tetlock thought that accountable participants would experience increased motivation to attend to all the information and would be therefore less prone to the primacy effect.

Participants were told that they would read a description of a court case and 18 brief summaries of evidence about the case and give their impressions of the accused person's guilt or innocence. Accountable participants were also told that the study was concerned with the "interpersonal communication of beliefs and attitudes." Participants did not know exactly what types of responses they would be asked to give, other than their impressions.

Accountability and order of information were the independent variables. Order of information was manipulated by the placement of favorable and unfavorable information about the defendant. The order of evidence was varied such that participants either read evidence in favor of the defendant followed by evidence against the defendant or vice versa. In the third condition evidence in favor of and against the defendant was randomly alternated. The three accountability conditions included: (a) no accountability, (b) pre-exposure accountability, and (c) post-exposure accountability. Participants in the no accountability condition were told that their responses would be confidential and not traceable to them personally. Participants in the other two conditions were told that they "would later be asked to justify their impressions of the accused person's guilt or innocence to an associate of the experimenter." The difference between the two accountability conditions was the timing of the instructions. In the pre-exposure accountability condition, participants were informed of their accountability before reading the information about the case. In the post-exposure condition, participants were informed of their accountability after reading all the information.

Dependent variables included a rating from 0 to 100 of each participant's impression of the likelihood that the defendant committed the crime and their verdict of guilty or

innocent. Participants were also asked to recall as much evidence from the case as possible, and this recall was coded for the number of items that were pro- or anti-defendant.

Results showed a main effect for order of information such that participants who read the evidence against the defendant first rated the defendant as more likely to be guilty than participants who read this information last. The authors interpreted this as evidence of the primacy effect. There was no main effect of accountability on the likelihood of the defendant's guilt. However, planned comparisons showed that pre-exposure accountability participants (those told they would have to justify their impressions prior to reading the evidence) did not demonstrate a primacy effect; that is, they were unaffected by the order of information provided. In addition, these participants showed better recall, remembering significantly more evidence (both pro- and anti-defendant) than unaccountable participants and participants informed of their accountability after reading the evidence. There were no effects for the dichotomous judgment of guilt or innocence.

The author suggested that accountability eliminated the primacy effect in pre-exposure conditions by affecting participants' encoding and processing, not by enhancing their recall. If accountability simply led to greater recall, this would have been shown in post-exposure accountability conditions as well, but it was not. Based on the enhanced recall of pre-exposure accountable participants, it was first suggested that these participants encoded the material more elaborately and processed it more deeply than post-exposure or unaccountable participants. However, the authors warned not to conclude that it is the depth of processing which leads to elimination of the primacy effect.

Further analyses showed that when primacy effects did occur they were not mediated by selective recall of evidence. In other words, it would not be accurate to conclude that greater recall in the pre-exposure condition is evidence for deeper, more elaborate processing, despite the fact that it is often a result of deeper processing. It was instead suggested that accountability may have interfered with the biased assimilation of later evidence into initial impressions. That is, participants may have been more careful about the conclusions they jumped to or more open to information revealed subsequent to their first impressions.

The following research addresses the role of accountability as a potential means of somehow motivating individuals to be more accurate in the formation of impressions of other people. More specifically, it addresses the role of accountability in motivating greater cognitive effort to reduce a common person perception error, known as the fundamental attribution error. It should be noted that an investigation of the effects of accountability on common judgmental biases, such as the fundamental attribution error, can reveal whether these biases are the result of a lack of ability or a lack of motivation and effort.

Tetlock (1985a) examined the effects of accountability on the attributions individuals made for a writer, based on a sample of the writer's work. Accountability was manipulated by informing participants that they would have to justify their impressions of the writer to an associate of the experimenter. Previous research had demonstrated the tendency for people to make internal attributions for others' behavior, despite the existence of potential external causes; this has been labeled the fundamental attribution

error. Tetlock hypothesized that accountability would serve to prevent faulty attributions in one of two ways. One way would be by motivating individuals to increase the amount of cognitive effort and carefulness allocated to the judgment task. A second process by which accountability might reduce faulty attributions is by leading people to be more cautious about what attributions they are willing to *express* and attempt to justify.

Participants read an essay on minority quota systems in college admissions and answered a series of questions regarding their impressions of the writer and their confidence of those impressions. Accountability, the direction of the essay (pro- or anti-affirmative action) and the degree of writer choice were the independent variables. Accountable participants were told that they would later be asked to justify their impressions of the writer to an associate of the experimenter, who was interested in the 'person-perception process.' These participants were informed either before reading the essay (pre-exposure accountability) or after reading the essay (post-exposure accountability). The manipulation of the timing of the accountability instructions was done to test the two previously mentioned possible effects of accountability. If accountability were to operate by causing participants to devote greater cognitive effort to the task, then pre-exposure accountability would have an effect, whereas post-exposure accountability would not, because the task would already be completed. However, if accountability were to operate by simply altering the attributions people are willing to express, then both pre- and post-exposure accountability would show effects on the attributions participants make. Again, participants who were not accountable were told that their responses were confidential. Before reading the essay, participants were told that the writer had either

chosen (high-choice condition) or been assigned (low-choice condition) his position on the issue. The essays either supported or opposed affirmative action. The dependent measures included participants' estimations of the writer's attitudes about the essay topic and other similar issues. Responses to all questions were given on a 21-point rating scale.

Evidence for the overattribution effect was found, such that participants' impressions of the writer's attitudes corresponded to the direction of the essay, whether the writer was believed to have chosen or not chosen the direction of the essay. However, pre-exposure accountability was found to moderate the overattribution effect; these participants were less likely to make extreme attitude attributions to the low-choice writer. It was suggested that this was not due simply to changes in what participants were willing to say because post-exposure accountability participants' responses were almost as strong as those made by unaccountable participants. If accountability acted to make participants more cautious about what they were willing to say, then responses from both pre- and post- exposure participants should be equally moderate. Instead, the responses of post-exposure participants were no less extreme than those of participants who were not accountable.

In addition, no significant differences in attributions were found across conditions for the high-choice writer. In other words, the extremity of attributions for the high-choice writer was equal across accountability conditions. This also argues against the possibility that accountability operates by altering the responses people are willing to express, otherwise this effect would have been evident in the high-choice condition as well.

Analysis of participants' confidence in their attributions yielded a significant writer choice X accountability interaction. Pre-exposure accountability led to lower confidence

relative to both unaccountability and post-exposure accountability. These results were consistent with those of the previously reported study, and the author's interpretations were similar.

Because of the different effects for pre- and post-exposure accountability, Tetlock concluded that the mechanism by which accountability altered attributions was by placing participants in a more analytic and vigilant mental set and serving to prevent, rather than reverse, the common judgmental bias. This prevention is thought to occur because individuals engage in what he calls "pre-emptive self-criticism," in which they imagine possible deficiencies in their position and also possible positive aspects of alternate positions. This can be regarded as a result of increased cognitive effort, rather than increased motivation to express the most justifiable attribution.

A study by Rozelle and Baxter (1981) examined the effects of both accountability and responsibility on participants' perceptions of target individuals' characteristics after watching a videotape of the target in a mock interview. The question addressed in this study was whether accountability and responsibility would serve to reduce errors in person perception. Previous research had found that one person's descriptions of a target person's characteristics are more likely to be a function of the perceiver than the perceived; this is evidenced by low agreement across different perceivers of the same target (low interjudge agreement) and high agreement within a perceiver across different targets (high intrajudge agreement). It was expected that accountability and responsibility would reduce this biased tendency by placing demands on the perceiver which would lead to more differentiated descriptions across targets (lower intrajudge agreement) and greater

consistency across judges for a given target (higher interjudge agreement). Accountability was defined as having to provide an explanation for or more information about target descriptions, versus being virtually anonymous. Responsibility was defined as having to give target descriptions that would be used for a real decision, versus being used for research purposes.

Participants watched two videos of interviews of graduate school applicants and completed a checklist of descriptive characteristics of the applicant. The checklist included bipolar adjectives, as well as a 'neither' response for each set of descriptors. Then they were asked to generate five more psychological characteristics on their own which would describe the target, as well as an adjective that would be considered the opposite. Accountability was manipulated by informing participants that they would later have to discuss their ratings of their perceptions of the target with the psychology department selection committee in order to provide the committee with more information. They were also told that applicants had access to their ratings and tended to take the opportunity to view them. Unaccountable participants were told that the ratings would be kept in strict confidence. It is important to note that the accountability instructions in this case did not mention that justification per se would be required, only that they may be asked to share more information. The degree of responsibility was varied such that participants thought their responses would either be used to make a real decision about the current applicant or not. High responsibility was induced by telling participants that their ratings would be considered along with other information in reaching a decision about the applicant. In the low responsibility condition, participants were informed that the decision had already been

made and that their ratings would be used as an aid to improve the future selection process.

Both the checklist responses and the participant-generated characteristics were used to determine the intra- and inter-judge agreement. Responses were considered to agree if they were in the same direction. There were 30 videotapes altogether and they were randomly paired and shown to two participants each. In this way, each participant saw two videos and each video was seen by two participants. This gave the researchers an opportunity to examine both intrajudge agreement across two targets and interjudge agreement for one target.

Consistent with predictions, high accountability and responsibility produced greater interjudge agreement and lower intrajudge agreement. More specifically, reliable and discriminating target descriptions were found for high accountability participants under both conditions of responsibility. The authors suggested that accountability, as an evaluation pressure, seemed to affect attentional processes, causing participants to pay more careful attention to the characteristics of the target. It should be noted that when accountability was low, high responsibility did lead to more accurate responses than when responsibility was low, but results for these conditions (low accountability-high responsibility and low accountability-low responsibility) were not significant. Thus, while results were strongest in the condition where both accountability and responsibility were high, responsibility itself did not appear to be as strong an influence relative to accountability. These results suggest that accountability and, to a lesser extent,

responsibility serve to increase attentional efforts, making target descriptions more accurate and reflective of the target, rather than the perceiver.

Opinion and attitude expression. The next two studies investigated the effects of accountability on the expression of attitudes or opinions regarding controversial issues. Specifically, Tetlock (1983a) examined the effect of accountability on the complexity of people's thinking about controversial issues. Accountability was manipulated by informing participants that they would later have to justify their attitudes on several issues to another participant. Two alternate hypotheses regarding the effect that accountability has on the way people respond to having to express their opinions or attitudes were tested. It was suggested that accountability may motivate individuals to process information in a more complex and effortful manner, possibly as a means to prevent themselves from appearing to lack good judgment. This increased complexity of thought would be accompanied by the adoption of more moderate views, in order to reduce the possibility of sharp disagreement. Alternatively, being required to justify a point of view could lead individuals to adopt the viewpoint which they believe would be viewed most favorably or would be most easily justified. This would require, of course, that the individual be aware of what position would be regarded as most favorable. In this case, accountability would not lead to more effortful thinking about the issues, but rather to the low-effort strategy of simply expressing the most easily justified response.

In a test of these hypotheses, participants were asked to spend five minutes writing down their thoughts on the issues of affirmative action, defense spending, and capital punishment and then respond to several attitude measures. These measures were three 7-

point semantic differential scales to measure the participants' attitudes toward the issues. The anchors were fair-unfair, good-bad, and wise-foolish. Accountability was the only independent variable, and there were four conditions. In three of the conditions, participants were accountable; that is, they expected to justify the positions they took on the attitude response scales to another participant. In one of these conditions, no other information about the individual to whom the participant would be accountable was given. In the other two conditions, the participants were told that the individual to whom they were accountable held either liberal or conservative views toward major social issues. Note that participants expected to justify only their responses to the attitude scales, not their reported thoughts; these were thought to be confidential and not traceable to them personally. In the fourth condition, participants were not accountable and they believed all of their responses would be confidential and not traceable to them personally.

The thoughts reported by participants were analyzed in terms of integrative complexity, which is a measure of the number of dimensions of a problem considered (labeled as differentiation) and the amount of connections made between these dimensions (labeled as integration). It is important to note that the degree of integrative complexity is not a reflection of the particular position an individual chooses to take, but rather the structure of the views. In addition, these thoughts were coded as liberal, conservative, or neutral. These codings were used to develop two additional measures, a difference balance index and a ratio balance index. The difference index was the difference between the number of liberal and conservative thoughts for each participant. The ratio index was the ratio of the number of either liberal or conservative thoughts (whichever was more) to the

total number of thoughts listed. For the difference index, scores close to zero reflected high inconsistency in thoughts; for the ratio index, scores close to one indicated high consistency in thoughts. Responses to the attitude scales were used as a dependent measure and an additional measure was calculated from the attitude scales to assess the extremity of attitudes. This was done to address the possibility that accountability causes people to take less extreme stances.

Analyses showed that participants who were accountable to an individual of known views (a liberal or a conservative) tended to report thoughts and attitudes consistent with the individual to whom they believed they were accountable. Contrary to predictions, participants accountable to an unknown individual did not report less extreme views than unaccountable participants. Although unexpected at the time, these results are consistent with what has since been learned about accountability. As previously mentioned (Tetlock, 1985a), accountability does not appear to alter the views people are willing to express, as evidenced by the difference between pre- and post-exposure responses. If it were to operate in this manner, there should be similar responses to accountability demands, regardless of when the individual was informed of these demands. Again, this is supportive of the suggestion that accountability affects how and what people think and not simply what they are willing to say. Other results showed that participants who were accountable to an individual of unknown views were found to think in significantly more integratively complex ways than participants in all of the other conditions, as indicated by higher ratings for level of integrative complexity. These accountable participants also had significantly lower scores on the difference balance index and on the ratio balance index than

participants in all other conditions. Both of these results indicate greater inconsistency in thoughts.

The contribution of this study is that whereas accountability may lead to increased complexity of thinking in some cases, it may lead to less effortful thinking in others. More specifically, if people know the views of the individual to whom they are accountable, they are likely to respond with less effort, by expressing views which they believe will be seen as most favorable. However, when it is not clear what responses are most favorable, participants will respond by thinking in a more complex manner by evaluating the issue in a more inconsistent and multidimensional manner.

A second study by Tetlock, Skitka, and Boettger (1989) replicated and expanded upon the previous study. In addition to varying the individual to whom the participant was believed to be accountable, the authors also varied the timing of the attitude measures. Whereas in the previous study the attitude measures were always given after participants reported their thoughts on the controversial issues, this study included an additional condition in which the attitude measures were completed before the thoughts were written down. It was predicted that participants in this condition would react to accountability demands by becoming defensive about their previously reported attitudes, since they would have already committed themselves to a position. Therefore, integrative complexity should be low, because participants would attempt to maintain consistency in their reported thoughts as a means of bolstering their position. Recall that consistency would represent low differentiation, which is a sign of low integrative complexity.

Again participants were asked to list their thoughts and feelings on the issues of affirmative action, university tuition, nuclear freeze, and capital punishment and to complete a series of attitude scales on the same issues. The scales used were the same as those of the previous study, which included three 7-point semantic differential items which measured each participant's attitudes toward each policy. Half of the participants reported their thoughts first and then completed the attitude measures, the other half did these tasks in reverse order. It is important to make clear that all participants, regardless of which task they completed first, were informed of their level of accountability prior to the first task. Therefore, the timing of the accountability instructions was not manipulated. Participants were assigned to one of four conditions of accountability. These were identical to those of the previous study; accountable participants expected to justify their responses to the attitude measures to another participant who was either a liberal, a conservative, or an individual whose views were unknown. Again, note that no participant thought they would be accountable for their thoughts. Accountability was imposed only for the attitude responses. In the fourth condition, participants were not accountable and believed all of their responses were confidential and not traceable to them personally.

The reported thoughts were again analyzed for integrative complexity and results were consistent with those of the previous study, for those variables that were repeated. In other words, those participants who were accountable to an individual of unknown views tended to think in significantly more integratively complex ways than participants in the other three conditions of accountability. Also, participants who were accountable to an individual of known views tended to report attitudes consistent with these views.

However, both of these results were found only for participants who reported their thoughts first and then completed the attitude measures. Participants who took an attitudinal stand first tended to respond by bolstering and becoming more committed to their attitudes. This was the case regardless of whether the participant was accountable to a liberal, a conservative, or an individual of unknown views. In other words, having committed themselves to particular attitudes, participants did not respond to accountability demands by adopting the viewpoints which would be seen as most favorable. Instead, they became even more committed to their original stand. These results provided evidence of yet another means of responding to accountability demands.

Judgments and decisions. The last and more pertinent domain of outcome accountability has been concerned with judgments and decisions. Adelberg and Batson (1978) examined the effects of accountability on the decision to engage in helping behavior. Participants were given information about six financial aid applicants and asked to make allocation decisions. Accountability and adequacy of resources were varied across participants. Accountable participants thought they would be meeting with a staff member involved with the project to review their performance or with the applicant to inform them of the allocation decision. Resources were either adequate to meet the needs of all six applicants or inadequate, such that not everyone's needs would be met. The measure of interest was the allocation effectiveness, which assessed the degree to which effective uses of the resources were made. An effective allocation was made if enough money was given to an individual to meet their predetermined need. An ineffective allocation was made if the amount of money awarded was insufficient to meet an individual's need. This was

considered ineffective because without assistance to meet their survival needs, students would be forced to drop out of school. Therefore, the help would be ineffective overall.

Results showed that when resources were inadequate, accountability led to more ineffective allocation of resources. That is, more money was wasted by allocating an insufficient amount to many individuals, instead of allocating a sufficient amount to only a few individuals. Here accountability for a decision outcome obviously did not lead to a more desirable outcome. It may be, however, that accountability for the process by which the decision strategies were made may have produced more desirable outcomes. Analysis of the strategies used to make allocation decisions revealed that only the unaccountable participants responded with the most efficient allocation strategy, presumably because they were not accountable for the outcome. Although it may not immediately follow, it is possible that shifting the accountability away from the outcome and towards the process may have led to a more effective process and a more favorable outcome.

In both situations, accountability presumably led to apprehension associated with having to justify a response. However, the responses were very different across these studies because of the different nature of the tasks. In the studies involving impressions and opinions, participants simply had to argue for what they thought. As long as it could be seen as defensible, it shouldn't have mattered what they thought since their opinions and impressions did not have any effect on others. Here the response, or decision, of the participant was very important to the individual to whom the participant was accountable. The financial aid decision could potentially alter the recipient's life in a drastic way. It could be argued that a high degree of responsibility was operating to influence

participants' reactions to the accountability demands. According to these results, accountability may have the potential to place too much pressure on an individual, causing him or her to act in less than effective ways.

A study by Hagafors and Brehmer (1983) examined the effect of accountability on the degree of consistency in judgments in a multiple cue probability learning task. In this type of task, participants are to learn to use a set of cues to make judgments. This requires determining the relationship between the cues and a criterion, and then applying this to predict the criterion from the cue. Learning should take place because feedback is given regarding the accuracy of judgments. It was hypothesized that participants who would be required to justify their judgments would make these judgments with greater consistency than those participants not required to justify their judgments, because applying greater consistency would make justification easier for these participants.

Participants were given cue values (from 1 to 15) which represented the amount of a fictitious substance in a patient's body. They were then asked to predict the criterion (values ranging from 1 to 50), which represented the severity of disease. The researchers manipulated outcome predictability (low vs. high), feedback (present vs. absent), and accountability (accountable vs. unaccountable). The presence of feedback included informing participants of the true criterion value following prediction. When feedback was absent, no information was given about the correct answer. The accountability manipulation required participants to explain in writing why they chose each particular level of criterion. It should be noted that participants actually followed through with the justification, whereas in other studies participants only expected to later justify themselves,

but never had to do so. The primary dependent variable of interest was the consistency of the individual's judgments, which was represented by the multiple correlation between the cues and the participant's predictions.

Analyses revealed a three-way interaction which showed that accountability led to greater consistency in judgment across trials, but only in conditions of no feedback and low outcome predictability. The authors suggested that the need to justify affected only the low predictability participants because consistency would already be high among the high predictability participants, regardless of accountability. In other words, for the high predictability conditions, there was no room for accountability to have an effect, because consistency was already so high. They also explained that accountability would not lead to greater consistency for participants receiving feedback because the feedback would cause them to persist in applying new rules, or testing hypotheses about the relationship between the cue and criterion. Without feedback, once a rule was chosen, it would be applied consistently. For these reasons, the power of accountability to increase the consistency of judgments was limited to those conditions in which outcome predictability was low and there was no feedback.

Schadewald and Limberg (1992) also studied the effects accountability on judgments, except in this case they were judgments regarding the strength of legal arguments. It was hypothesized based on previous research that participants who heard an argument which followed a natural order of progression and causality would judge that argument to be stronger than one which was not presented in such fashion, simply because the former would be more easily understood and mentally constructed. However, it was thought that

accountability would moderate this effect and cause participants to be less susceptible to the effects of the information order. This pressure to be accountable would cause participants to focus more on the facts presented in the argument, instead of just on the sequence of the events.

Participants were presented with one of two tax cases; one described an individual's intentions regarding forming a partnership and the other described intentions for operating a kennel. The applicable tax laws were provided and two arguments were given, one which argued that the requisite intent existed (affirmative argument) and one which argued that it did not exist (negative argument). Participants read the arguments and rated the relative strength of the arguments on a 21-point scale, and then gave a dichotomous decision about which one was stronger. All participants received competing arguments regarding intent, and the order in which the affirmative and negative arguments was presented was counterbalanced across all participants. However, the order in which the information was presented within the arguments was varied. The facts within the arguments were presented either in a causal order or random order. High accountability was induced by having participants justify their judgments of the strength of the argument in writing. No justification was required of or mentioned to participants who were not accountable. In sum, the tax case, information order, and accountability were the independent variables.

Results showed that accountability reduced the typical response of choosing the argument in which the facts were presented in causal order as the stronger argument. In conditions of low accountability, information order was found to have an effect on

judgment, such that the causal order was seen as stronger than the random order. When accountability was high, this effect was no longer present. In other words, neither the causal nor the random order of events was seen as a significantly stronger argument than the other. A postexperimental questionnaire revealed that participants found those arguments presented in causal order to be more coherent and easier to understand. This supported the previously mentioned logic that participants would find a causal order of events easier to understand. The authors concluded simply that requiring participants to be accountable reduces the likelihood that they will be susceptible to thinking that a causally ordered argument is easier to follow, and therefore stronger.

Recently, Murphy (1994) examined the effect of accountability on covariation judgments. These judgments were somewhat similar to those required of participants that judged the criterion of disease from cues, a study discussed earlier (Hagafors & Brehmer,1983). However, in this study, the task was different, and it allowed for the researchers to examine the strategies used in the judgments. It had been shown in previous work that participants performing covariation tasks tended to use very simple strategies, resulting in poor assessments. Based on the promising results of much of the work already cited, Murphy speculated that accountability might spur participants to use more complex strategies in their covariation assessments, if indeed additional effort was all that was required.

Participants were given 12 problems, each of which gave values for two crossed variables, presented in a 2 X 2 table. The values presented in each of the four cells represented the relationship between a fertilizer and the health of a plant. Therefore,

fertilizer vs. no fertilizer was crossed with healthy vs. unhealthy. Based on these cell values, participants responded to a question regarding the degree of covariation demonstrated in each of the problems. The question required the participant to use the given values to rate on a 7-point scale whether the plants which received the fertilizer would be healthier than, less healthy than, or as healthy as plants which did not receive the fertilizer. Only the direction, not the actual value, of the rating was used to determine accuracy. Accountable participants were told that they would later be asked to justify their judgments (ratings) to the experimenter and that other participants would also ask them questions. There was no mention of accountability to the rest of the participants.

The problems were differently structured, and were divided accordingly into four groups, depending on the particular strategy that was required to correctly solve them. In this way, the number and type of problems solved served as an indicator of the specific decision strategies used. For example, if a participant were to correctly solve all of the problems, it could be concluded that a decision strategy called the conditional probability rule had been applied (since it was required to solve the most complex group of problems). It was found that accountable participants showed more complex patterns in strategy employment than unaccountable participants. The author concluded that previous findings which showed that participants did not apply complex strategies in covariation assessment were not the result of an inability to do so. Accountability demands resulted in the use of more complex decision strategies.

As can be seen from the above studies, a great deal of support has been generated for the proposition that accountability can, under certain circumstances, lead to enhanced

cognitive processing. The above studies generally required that participants simply justify their responses, whether these consisted of impressions, opinions, attitudes, decisions, or judgments. Once again, these instructions are most consistent with the notion of accountability for an outcome, although they were not labeled as such. Now the focus will turn to studies in which the accountability instructions were directed slightly more towards a process justification.

Process Accountability

Impression formation. Two studies investigated the effects of accountability for information used to form impressions of others on thought complexity and accuracy of impressions. Tetlock and Kim (1987) demonstrated that in the absence of accountability demands, participants are quick to draw conclusions about the personality of others, tend to base these impressions on limited information, and are overly confident in their predictions. The authors suggested, however, that accountability might once again serve to reduce these types of biases in a personality prediction task by causing participants to think in more integratively complex ways, thereby improving the accuracy of their impressions.

Participants read three individuals' responses to a 16-item personality test and then gave a short personality sketch (descriptions of at least three sentences in writing) of each person. Then they were asked to predict the other individuals' responses to an additional set of personality items and rate their confidence in the correctness of each prediction. Participants were told that the study was concerned with the person-perception process, defined as the way people use various types of information to form impressions of others.

Accountable participants were told that they would be involved in a detailed interview with the experimenter to investigate "the types of information people use to form impressions of others." In addition, the interview would be audiotaped for future analysis. Accountability instructions were given either before or after participants had read the test-takers' responses and written the personality sketch. Unaccountable participants were told that their impressions would be completely confidential and not traceable to them. The written personality sketches were coded by raters for integrative complexity, a measure of the degree of differentiation and integration of concepts. The predictive accuracy of the item responses and the appropriateness of confidence ratings were also analyzed, both through the use of detailed statistical analyses.

Consistent with previous research, preexposure-accountability led to more integratively complex and accurate descriptions along with lowered confidence (which was more appropriate) in their predictions. However, the accuracy and confidence effects were found to still be significant even after controlling for integrative complexity. Therefore, accountability appears to have some effect on accuracy and confidence independent of its effects on complexity of thought. Tetlock and Kim suggested that accountability may not only lead to more analytic thought but may also serve as a "social brake on judgmental biases." As a means of doing this, accountability may cause individuals to respond in a manner which disrupts automatic processing. However, it can only do this when participants are informed of their accountability before being exposed to the information that would normally be processed more automatically. This explains why postexposure-accountable participants reacted no differently than unaccountable

participants. Individuals informed of their accountability after automatic processing only have access to the products of their thoughts and therefore cannot correct the process.

Thus far, most of the research which has demonstrated that accountability leads to increased complexity of thought has shown positive outcomes of such enhanced processing. However, Tetlock and Boettger (1989) have shown that this effect of accountability is not always desirable, especially in situations when the information that is processed more integratively may not be relevant to the task at hand. Their study investigated the influence of accountability on the dilution effect for a person perception task. The dilution effect is the tendency for nondiagnostic information to dilute the extremity of predictions people make. In other words, when given information that is diagnostic (useful to base predictions upon) and information that is nondiagnostic (irrelevant to predictions), people normally tend to make predictions that are more moderate than when only diagnostic information is given. It was speculated that accountability would exacerbate this effect by causing participants to think in more complex ways about all the information given, whether it was previously determined to be relevant or not.

The following study consisted of two experiments which were identical except for the content of the tasks. Participants in the first experiment reviewed a description of a student, and participants in the second experiment read a description of a psychotherapy patient. In both experiments, participants subsequently wrote their thoughts about their impressions of the individuals, made a specific prediction about the individual (GPA for the student and likelihood of being a child abuser for the patient), and rated their

confidence in their prediction. The prediction for the patient required a rating on an 11-point scale. It was not clear how many points were on the scale for the confidence ratings. All participants were told that the study was concerned with person perception processes and that experimenters would look at how people use information to form impressions and how those impressions are used to make predictions. Accountable participants were told prior to reading any information that they would be interviewed later so that the researcher could "explore the types of information used to form impressions of others." Unaccountable participants were told that their impressions would be confidential and not traceable to them. In addition to accountability, the direction of the diagnostic evidence and the type of evidence were manipulated. The direction of evidence was varied by giving participants information that either suggested the student would have a high GPA or a low GPA and information that suggested that the patient was either a child abuser or was not. The type of evidence was varied such that participants received either a small amount of diagnostic information (control condition), diagnostic plus nondiagnostic information (dilution condition), larger amounts of diagnostic information (augmented condition), or a mixture of diagnostic and counterdiagnostic information (contradictory condition). Therefore, in both experiments, the variables of accountability, direction of evidence and type of evidence were completely crossed. Integrative complexity, extremity of predictions, and the appropriateness of confidence ratings were the dependent measures.

Consistent with predictions, evidence of the dilution effect was shown; participants given nondiagnostic information in addition to diagnostic information (dilution condition) tended to make less extreme predictions than control participants. In addition,

accountability exacerbated the dilution effect, such that it was much stronger for accountable participants than unaccountable participants. In other words, in the diluted condition, participants who were accountable gave a predicted GPA closer to the average GPA (participants were told to predict a GPA of 3.0 if they had no useful information on which to base predictions) than unaccountable participants

A similar pattern was found for the second experiment; accountable participants in the dilution condition predicted a likelihood of being a child abuser that was closer to the mean (a rating of 6, which represented no greater or less likelihood than anyone else) than unaccountable participants. Relative to unaccountable participants, accountable participants also made more extreme judgments in the augmented condition and less extreme judgments in the contradictory condition. Consistent with previous research, accountable participants were more integratively complex in their thinking and had reduced confidence in their predictions relative to unaccountable participants, who tended to be overconfident. Integrative complexity was found to be a significant covariate for the accountable participants in the dilution condition, but the interaction was still significant for the first experiment when complexity was partialed out.

Although this research has highlighted a negative outcome of accountability, it is not inconsistent with previous conclusions about the effects of accountability. Because the strength of the interaction was reduced by removing the effects of complexity, it is still suggested that increased complexity of thought is one of the mechanisms through which the dilution effect is exacerbated by accountability. The authors suggested that accountable participants thought so complexly about the information that they made great

efforts to make use of all the information, whether or not it was objectively described by others as diagnostic. Remember that less extreme predictions were made by accountable participants in the dilution condition, but more extreme predictions were made in the augmented condition, where the information was useful to making predictions. Once again, it was shown that accountability could not be operating to simply alter what people are willing to say, since extremity of judgments varied as a function of the types of information available, not as a function of accountability.

Judgments and decisions. Consistent with the previous discussion of outcome accountability, this last section concerning process accountability includes those studies in which participants were asked to make a judgment or a decision. Early research by McAllister, Mitchell, and Beach (1979) focused on people's selection of decision strategies and the effects of accountability, decision significance, and decision reversibility on such selection. The study was conducted to provide more information for a model previously proposed by two of the authors, Beach and Mitchell (1978). The model accounts for strategy selection by applying a cost-benefit analysis to the selection process. According to the model, the cost of using a strategy increases as the complexity of the strategy increases. However, the possibility of arriving at a correct decision (a benefit) also increases as the complexity of the strategy increases. Therefore, in choosing which decision strategy to use, the decision-maker is confronted with assessing these costs and benefits. In addition, however, other outside factors can enter into the equation. Three such factors are accountability, decision significance, and decision reversibility. No

particular hypotheses were made regarding how these variables would affect decision strategy selection.

Three studies were conducted, but the first two manipulated accountability in a manner which would be more appropriately labeled here as responsibility. Participants were asked to read descriptions of several organizational problems, assume the role of the central character, and then choose a decision strategy from four decision strategies outlined by the experimenter. In the second experiment, participants again chose a decision strategy, but also had to employ the strategy and actually make a decision. In the organizational problem, the central character was either personally responsible for the decision or his decision would be reviewed by others. Because participants were supposed to assume the role of the central character, this variation in the central character's decision responsibility served as the accountability manipulation. As a means of strengthening this manipulation, the character was also described as being under a lot or a little pressure from his boss. The decision was described as either highly significant or not, and either reversible or not.

Because there are no costs associated with simply selecting a strategy, the authors devised a system whereby costs were associated with selection so that participants couldn't simply choose the most complex strategy every time. This system allotted participants a given number of 'decision resource units' (DRUs), which represented the amount of time, effort, and analysis required for the use of a particular strategy. Each strategy was assigned a number of DRUs, with more analytic strategies having a higher number. In choosing their strategies, participants could not exceed the number of DRUs

that had been allotted to them. In this way, the authors developed costs associated with strategy selection.

Both studies showed main effects for all three variables and no interactions. Accountability, decision significance, and decision irreversability all resulted in the choice of more highly analytic strategies. These studies appear to be even one step further removed from real life than the previously mentioned studies since the task required the participant to assume the role of a character in the problem, instead of imposing these variables directly on the participant.

The third study accounted for this lack of realism by imposing the problem directly on the participant; they were no longer asked to assume the role of the main character in a written problem. In addition, accountability was operationalized in a more traditional manner; participants expected to defend their decisions to others. The same variables were manipulated as in the first two studies, but participants were asked to make true decisions that were either part of a long term, important research project or of a small pilot study (significance manipulation), could or could not be reversed (reversibility manipulation), and that they would either have to defend in front of a small group of their peers or not (accountability manipulation).

Results showed main effects for accountability and significance, but not for reversibility. Accountability and high significance caused participants to choose more highly analytic strategies. The effect of accountability was significant, while the effect of decision significance was only marginally significant. It should not, however, be concluded that accountability is a stronger variable than significance. The findings are limited to this

study and the means by which the variables were manipulated and measured. The important thing to note, however, is that accountability led to the selection and implementation of more complex decision strategies, a result that is wholly consistent with research previously discussed.

Arkes, Christensen, Lai, and Blumer (1987) examined the effect of justification on participants' degree of confidence in their judgments of answers to general knowledge questions. Justification was manipulated by telling participants that they would have to explain some of their answers to a group of other participants. It was thought that having to justify a response would reduce the overconfidence that individuals typically have in the accuracy of their judgments.

Justification was the only independent variable, and participants in the justification condition were told that after completing the questionnaire, they would each be asked to explain two of their answers to the rest of the group. No mention of justification was made to control participants. Participants were given 35 general knowledge questions, each followed by two possible answers. An example of the type of question asked was "Which is larger? Great Britain or Greenland?" All participants were asked to answer each of the questions and then give an estimate of their confidence in the correctness of their response on a 50 to 100% scale. The experimenter gave an example of an answer to a question and gave a justification for why she chose her answer. The first five questions were then used as practice questions for the experimental group. After everyone answered all five, participants were each asked to explain to the group how they decided on a particular answer. Participants in the experimental group then answered the remaining 30

questions and gave their confidence levels. After completion of the questionnaire, participants were asked to explain their answers to two randomly chosen questions. The dependent measures were accuracy of the answers, confidence level, and the length of time in 10ths of a minute that participants spent on the questionnaire. In addition, a measure of overconfidence was calculated by taking the average confidence level reported and subtracting the proportion of the items answered correctly.

Consistent with the hypothesis, participants who had to justify their responses were significantly less overconfident in their responses than control participants. However, their answers were no more accurate than those who did not have to justify their responses. They did, however, take significantly more time to complete the questionnaire than control participants. The authors suggested that participants spent more time reviewing the possible answers and therefore became less confident in the accuracy of a given response.

It is important to note that decreased overconfidence was not accompanied by increased accuracy in this study. It is not clear why this occurred; it may have been due to the nature of the questions asked. There simply may not have been much variance in the participants' ability to answer these general knowledge questions in the first place. However, it is possible to imagine situations in which increased consideration of multiple alternative answers may lead to increased accuracy, especially when the correct answer is not obvious. One note of criticism toward this study was the manner in which time on the task was measured. Participants were asked to write down the number displayed on a clock-counter when they had completed the questionnaire. These instructions were given prior to answering any questions, so participants were probably aware that they were

being timed. This measure may have served as an unintended secondary pressure for all participants, and it is not clear in what way it may have altered their accuracy or reasoning. However, because this was a constant across all participants, it could not affect differences between the experimental and control groups, but it should be kept in mind when interpreting the results.

The last study to be discussed is most relevant to the current study because it tested the effects of both accountability and responsibility on judgments in a multiattribute decision making task. A multiattribute decision making task involves a set of alternatives for which qualities along various dimensions must be considered. As in previous studies, accountability and responsibility were examined as a potential means of increasing cognitive effort and the use of more complex decision strategies. The dependent variables were measures of cognitive effort inferred from assessments of the amount of information searched. Weldon and Gargano (1988) asked participants to evaluate a series of jobs, each of which was described on five dimensions. The overall evaluation consisted of rating how good each job was on a scale of one to seven with very bad and very good as anchors. Accountability was manipulated by asking participants to provide their names and phone numbers so that the experimenter could contact them later to learn what information was used to make the judgments and why certain judgments were made. Responsibility was varied by leading participants to believe that they were either one of 16 evaluators (shared responsibility) or that they alone were the only evaluator (sole responsibility). Those who believed their evaluations would be combined with others' thought that their responses were anonymous. All participants believed their evaluations would be used by a real

vocational research organization in making future decisions. Therefore, the decision importance was quite high for all conditions.

Weldon and Gargano expected that accountability would moderate the relationship between responsibility and effort by reducing the differences typically found between conditions of shared and sole responsibility. It has been shown in the past that individuals who share responsibility for this same task tend to exert less cognitive effort than individuals who feel sole responsibility (Weldon & Gargano, 1985). The authors predicted that accountability would eliminate these differences by causing all individuals to exert the same amount of cognitive effort, regardless of degree of responsibility. Results revealed an interaction of accountability and responsibility on amount of information searched, such that judges who worked alone tended to search for more information than participants who shared responsibility, except under conditions of accountability. Thus, for this dependent variable, accountability reduced the typical cognitive loafing effects that occur when individuals' sense of responsibility is diffused. However, there were no significant effects of accountability on a measure of the degree of consistency with which information was processed. The authors suggested that these results could be due to participants' expectations about what they would have to justify. Since the instructions implied that participants would be accountable for which dimensions were used and how they influenced judgment, participants were less concerned with consistency in judgment and more concerned with what information they were using to arrive at a judgment.

The interpretation offered by Weldon and Gargano (1988) highlights the previously overlooked importance of the manner in which accountability is manipulated and the

potential for what may appear to be subtle differences in instructions to cause significantly different results in performance. The effects of accountability may depend on what one makes someone accountable for. More specifically, it demonstrates the possible differential influence of accountability that emphasizes attention to the processes involved in judgment versus attention to simply the outcome of such processes.

Some may suggest that it is perhaps unreasonable to expect a great deal of improvement in our abilities to introspect and discern what processes are actually occurring. After all, much research has demonstrated that we are very poor assessors of our mental activities since we usually only have access to their products. This is true in spite of our convictions that we do have such access (Nisbett & Wilson, 1977). However, the results of many of the previous studies suggest that there may be room for a motivational influence such as accountability to increase attention toward the cognitive processes which guide performance.

Accountability, Responsibility, and Identifiability

Accountability and responsibility. One of the goals of the present study was to tease apart the effects of accountability and responsibility. As mentioned before, accountability has, within the bulk of the research, come to mean having to provide an account for or justify one's opinions or position. Responsibility, on the other hand, seems to imply some degree of ownership of results or outcomes that is not necessarily implied by accountability. This liability for outcomes is likewise not necessarily accompanied by justification. Previous research has not made a clear distinction between these variables and has sometimes used them interchangeably.

McAllister, Mitchell, and Beach's (1979) previously mentioned study had participants assume the role of the central character in a written organizational problem. The character was described as either personally responsible for the decision or only minimally responsible because the decision served as a recommendation to be reviewed by others. Participants were not required to justify their chosen strategy, nor was this required of the central character, in whose position participants imagined themselves. This situation is quite different from the majority of the research, in which accountable participants truly believed they would have to verbally justify their behavior to another individual. As a means of bolstering the manipulation or intended feelings of accountability, an additional component of pressure was added to the problem. The central character was described as being under either high or very little pressure from his supervisor to make the decision. This additional manipulation serves to complicate the issue even further, since it is not clear how pressure affects decision strategies. While accountability typically leads to more effortful processing, it appears a reasonable possibility that pressure could lead individuals to respond in variable ways, depending on the kind of pressure (e.g., social, financial, or time) and on individual differences. Some people may find pressure to be motivating while others may feel it to be debilitating. These issues are equally important but should be tested separately in order to isolate their effects. These studies confounded several variables, making it difficult to incorporate the findings into the accountability research.

An additional study not previously mentioned examined the effects of accountability on training effectiveness (DeMatteo, Dobbins, & Lundby, 1994). Participants went

through a training session on interviewing skills and subsequently responded to questions regarding their reactions and motivation to transfer the training. A test on the content of training material was completed as a measure of learning. Participants thought they would either participate in a discussion with the experimenter and her assistants, be asked to watch a videotape of an interview and critique it, or not have to do anything following training. Although results showed that the accountability manipulations led participants to learn more and take more notes, this manipulation did not include a true justification. Participants were obviously motivated to attend to the training, and this effect of the manipulation should not be overlooked. However, the subtle differences between this and other accountability manipulations should not be ignored either.

Looking from the opposite perspective, few of the accountability studies reviewed earlier involved any degree of responsibility, such that participants were liable for some future outcomes resulting from their judgments or decisions. This exclusion does not make the results any less revealing and thus should not be viewed as a fault; however, it does seem to limit the external generalizability since it is likely that individuals who are in a position of defending their views or decisions are typically responsible for the outcomes that result from their implementation.

Only two studies previously mentioned led participants to believe their decisions would be real and that they would therefore be responsible as well as accountable. The first study involved the financial aid allocation decision (Adelberg & Batson, 1978). Results of this manipulation found negative effects of accountability, but the variables of

accountability (having to justify the decision) and responsibility (being liable for the outcomes) were essentially confounded since participants perceived both to be operating.

The second study (Weldon & Gargano, 1988) crossed accountability and responsibility and measured cognitive effort expended in the evaluation of a series of part-time jobs. Here participants were either solely or jointly responsible and either accountable or not accountable. The only problem with this study is that it served to confound identifiability with responsibility. Participants who shared responsibility with others were told that their answers, which were entered into a microcomputer, would be immediately combined with those of other participants and, therefore, not traceable to the individual. In this way, participants who were solely responsible were identifiable and participants who shared responsibility were not identifiable. It is not clear how participants who perceived their responses to be anonymous could be convinced that they were simultaneously accountable and should be prepared to discuss why they responded as they did. In any event, it is important that the effects of identifiability be extracted from those of responsibility.

Accountability and identifiability. Most of the remaining studies which did not include an element of responsibility tended to confound accountability and identifiability. Participants who were not accountable were told that their responses were completely confidential and therefore not traceable to them personally (Rozelle & Baxter, 1981; Tetlock, 1983a; Tetlock, 1983b; Tetlock, 1985a; Tetlock & Boettger, 1989; Tetlock & Kim, 1987; Tetlock, Skitka, & Boettger, 1989). Although this method is recognized as a means to enhance the power of the accountability manipulation, it is also important to

recognize that these variables are conceptually distinct and should be treated as such, despite their potential to co-occur in daily life.

Responsibility and identifiability. Research outside the area of accountability has examined the effects of responsibility and identifiability. Much research in the area of social psychology has demonstrated what is known as social loafing, or the reduction of individual effort when individuals work in groups rather than alone. Latane, Williams, and Harkins (1979) asked college students to make noise (clapping or shouting) either alone, as part of a true group, or as part of a pseudogroup (participants thought their output would be pooled with that of others). Participants who believed their output was shared with others did not perform as well as individuals acting alone. In other words, participants relaxed their efforts when they thought their output would be shared, and thus not identifiable. To follow up on this reasoning, Williams, Harkins, and Latane (1981) first replicated the previous experiment with a shouting task and found the same results. The authors then included an additional manipulation of identifiability. This variable turned out to be quite important; it eliminated social loafing effects when present and led to reduced efforts by individuals working alone when removed.

These findings are especially important to keep in mind when interpreting the results of the accountability research. If the removal of identifiability was enough to lead to significant differences in performance in the shouting experiment, it is equally possible for it to have similar effects in those studies that confounded identifiability with either accountability or responsibility.

This Investigation

Overview of variables. The purpose of this study was to tease apart the effects of accountability, responsibility, and identifiability on the quality of the alternatives generated to an ill-defined problem. Accountability is defined as whether or not an individual provides a justification for a particular response; accountability is further differentiated by whether the problem solving process or outcome must be justified. Responsibility is defined as the perception that one shares responsibility for a task with others (shared responsibility) or whether one is solely responsible for a task (sole responsibility). Lastly, identifiability is defined as whether or not an individual perceives his or her responses to be identifiable or traceable, versus anonymous. No study to date has systematically examined the effects of these three variables on the alternative generation stage of ill-defined problem solving. This study defines quality as the resolving power of the generated alternatives. Resolving power is the degree to which the solution addresses the conflicting aspects of the problem (Upshaw, 1975, cited in Scherer, 1989). The use of resolving power as the chosen measure of quality will possibly provide a theoretical contribution to the existing line of research on alternative generation conducted by Scherer and Billings (1986) and Butler (1995), which has also used this same measure of quality. In addition, the investigation of the antecedents of resolving power may have practical implications for organizations attempting to understand how to maximize the generation of alternatives that resolve multiple objectives.

Predictions and rationale. The first objective was to determine whether accountability adds any motivational force beyond that produced by high identifiability. Though previous

work confounded accountability with identifiability, the general assumption of this study is that due to the justifiability component of accountability, accountability still causes a greater expenditure of cognitive effort than no accountability, even under conditions of high identifiability.

> Hypothesis 1: The quality of the solutions generated will be higher under both conditions of accountability (process and outcome) compared to the no accountability condition.

The second objective was to tease apart the effects of accountability for a process from the effects of accountability for an outcome on the quality of solutions generated. Though it appears that accountability seems to mobilize more cognitive effort, it is not clear where and how that effort will be directed. Moreover, no study has revealed whether accountability for a process is more or less efficacious in producing high quality solutions compared to accountability for an outcome. Recall however, that previous research has shown an increase in the quality of solutions generated as a result of problem structuring techniques, which serve as aids to facilitate the problem solving process (Pitz, Sachs, & Heerboth, 1980; Scherer & Billings, 1986). In addition, the work of Herek et al. (1987) in their study of international crises served to highlight the potential importance and benefit of focusing attention on the problem solving stages as a means of arriving at higher quality outcomes. For these reasons, it was proposed that under conditions of high identifiability, accountability for a process would result in greater cognitive effort being directed towards the problem solving process than accountability for an outcome, which would direct effort

toward the problem solution. Consequently, efforts directed at the process would be reflected by improved quality in the outcome, or solution.

> Hypothesis 2: The quality of solutions generated will be higher under conditions of process accountability than for outcome accountability.

A third goal was to separate the effects of accountability and responsibility on solution generation and to determine whether accountability moderates the effects of responsibility. As noted before, accountability has often been regarded as having to give a justification for something, whereas responsibility has been studied by varying the degree of responsibility (shared versus sole). Some studies have used these labels and operationalizations interchangeably, making their effects unclear. Whereas it has typically been shown that shared responsibility results in reduced levels of effort relative to sole responsibility, it was expected that due to both the identifiability and justification components of accountability, accountability would serve to moderate the effect of responsibility by eliminating the differences in effort across responsibility conditions.

> Hypothesis 3: The average of the quality of solutions across both levels of responsibility under both levels of accountability will be higher than either shared or sole responsibility under no accountability. In addition, solution quality will be higher under sole responsibility compared to shared responsibility in the no accountability condition.

The final objective of this study was to isolate the effects of responsibility and identifiability. It has long been known that when individuals' outputs are identifiable, they

are likely to exert high levels of effort, and when their outputs are not identifiable, they consistently exert low levels of effort (Williams, Harkins, & Latane, 1981). These results occur regardless of whether these individuals perceive themselves to be part of a group or not. It therefore follows that any attempts to examine the efforts of individuals either as part of a group or alone should not overlook the role of identifiability. However, research examining the role of responsibility has tended to manipulate this variable by inducing participants to believe that they share responsibility with others or are solely responsible for their outputs. When responsibility is shared, members' outputs are usually pooled together, thus making their outputs unidentifiable as well. It is therefore speculated that much of the reduced efforts resulting from shared responsibility are in fact due to a lack of identifiability. For these reasons, it was hypothesized that under conditions of no accountability, high identifiability would result in consistent levels of cognitive effort across shared and sole responsibility conditions.

> Hypothesis 4: The quality of solutions generated will be equal across conditions of shared and sole responsibility when identifiability is high; when identifiability is low, sole responsibility will yield higher quality solutions than shared responsibility.

Method

Participants and Design

Participants were 296 undergraduates enrolled in psychology at the University of Nebraska at Omaha. They were volunteers and received extra credit in exchange for their participation. Participants were randomly assigned to one of twelve treatment conditions. These twelve conditions were the result of a 3 X 2 X 2 factorial, with accountability (process, outcome, or no accountability), responsibility (shared vs. sole), and identifiability (high or low) as the independent variables. The average age of the participants was 24, and 93 were male and 203 were female. 224 participants were white, 34 were African American, 4 were Hispanic, and 34 were of some other ethnic background.

Materials and Task

Participants were presented with a written description of a dilemma regarding parking problems at UNO (See Appendix A). This problem was chosen from a series of ill-defined problems that were previously tested to identify participants' reactions to the problems (Scherer, Butler, Reiter-Palmon, & Weiss, 1994). This problem was rated as high in realism by student participants. For this reason, it was speculated that this problem would allow for high believability in the responsibility conditions. In other words, because of the nature of the problem, participants would be likely to believe that they were responsible for generating solutions that the university might consider.

Design constants. All participants were asked to generate as many solutions as possible to the parking problem and to choose one solution which they felt was best. In

addition, all participants were told that that their solutions would be considered by the university in its attempt to resolve the parking dilemma.

Manipulation of Independent Variables

Accountability. The level of accountability was manipulated by the experimenter through task instructions. Outcome accountability participants were told that after generating solutions and choosing the best solution, they would have to provide justification for their choice of best solution, which would later be read by UNO staff members. Process accountability participants were told that after generating solutions and choosing the best solution, they would have to provide a written justification for each of their solutions, which would later be read by a UNO staff members. All accountable participants provided written justification according to instructions, following completion of solution generation. For unaccountable individuals, no mention of accountability was made.

Responsibility. Participants in the sole responsibility condition were led to believe that they alone were responsible for generating solutions to the problem. They were led to believe that other participants were solving other problems identified by the university. Participants in the shared responsibility condition were led to believe that responsibility for generating solutions to the problem was shared with other individuals who were also responding to the same problem. A manipulation check measure was taken to ensure that participants understood and believed their assigned degree of responsibility.

Identifiability. Identifiable participants were asked to include their name on all pages of their responses. It was emphasized to unidentifiable participants that their outputs were anonymous and therefore not traceable to their identity.

Dependent Measures

Several measures of performance were examined for the generated solutions. Quantity of solutions was calculated by summing the total number of unique, or non-repeating, solutions generated to the problem for each participant. The quality measures were based on resolving power, or the degree to which a solution addressed and resolved the conflicting aspects of the problem (Upshaw, 1975). A total of 1800 solutions were generated altogether and a reduced set of 832 unique, or non-repeating, solutions was derived from the complete set of 1800 solutions. Two raters independently rated each of the 1800 solutions as unique or repeating and then met to reach consensus over disagreements. This process facilitated and enhanced the reliability of the final resolving power rating process by reducing the number of solutions each rater had to read and rate. For solutions that were repeating, the raters also determined which unique solutions they matched. In addition to creating a reduced set of 832 unique solutions, this process ensured that every possible solution was matched to and assigned a unique solution number. Ratings of resolving power were then assigned to the reduced set of 832 unique solutions by another pair of graduate student judges after a period of training and practice. Ratings for resolving power were based on an 6-point scale, ranging from not addressing any of the issues in the problem at all to addressing only part of the problem to fully addressing all issues of the problem well (Appendix B). This resolving power scale has

been used in a number of problem-solving studies in the past to assess solution quality (e.g., Butler, 1995; Scherer, 1989, Scherer & Billings, 1986). The essential conflict of the problem was predetermined, and raters were first asked to decide whether each solution resolved one or both facets of the essential conflict. A solution that resolved only one facet of the problem was placed in the 1 to 3 rating category, and a solution that resolved both facets of the problem was placed in the 4 to 6 rating category. The kappa coefficient of agreement was used to determine the degree of interrater reliability for the rating process. The kappa statistic assesses consensus among multiple raters assigning objects to categories, and it includes a correction for chance agreement. A kappa of 1 indicates complete agreement, and a kappa of 0 indicates no agreement, other than that expected by chance. Kappa for this preliminary rating process indicated that the raters' agreement was significantly greater than chance (kappa = .77 ,z =35.09, $p < .0001$). Raters then made independent ratings of each unique solution and assigned the final rating from 1 to 6. Discrepancies were resolved through consensus. Again, the raters' agreement before consensus was significantly greater than chance (kappa = .68, z =35.30, $p < .0001$).

Three indices of the resolving power of solutions were formed: (a) the number of solutions generated with high resolving power, with high resolving power indicating a solution rated 4 and above on the 6-point resolving power scale, (b) the proportion of solutions with high resolving power relative to the total number of solutions generated, and (c) the rating of the solution with the highest resolving power. These three indices were chosen because they each capture a different aspect of solution quality. The number of resolving alternatives simply assesses the number of high quality solutions, whereas the

proportion of resolving alternatives assesses quality while taking into consideration the quantity of solutions generated. The rating of the solution with the highest resolving power is a measure of the best solution the participant generated.

Procedure

Participants were randomly assigned to one of the twelve conditions. All participants were presented with a written description of the parking problem and the task instructions (Appendix C). Participants were also presented with an audio tape of the parking problem and instructions. Participants were asked to play the tape on the tape player provided by the experimenter and read along as they listened. After they finished reading and listening, participants generated a list of alternative solutions to the problem, and then chose the solution they felt was best. They were allowed to refer to the problem as often as they wished and were given ample paper to respond, so as not to limit the number of solutions.

Participants in the outcome accountability condition were told up front that after generating solutions and choosing the best solution, they would have to provide written justification for their *choice of best solution*, which would later be read by UNO staff members. Participants in the process accountability condition were told that after generating solutions and choosing the best solution, they would have to provide written justification for their *list of solutions* and how they arrived at their solutions, to be read later by a UNO staff members. No mention of justification was made to unaccountable participants.

Participants in the high responsibility condition were told that they alone were responsible for generating solutions to the parking problem since no other participants

were responding to the same problem. Low responsibility participants were told that their solutions would be considered along with those of other participants.

Participants in the high identifiability conditions were asked to write their names on each page as a reminder that they were identifiable. In addition, identifiable participants were given an "identification code" which was written on their scantron sheet. This code was mentioned to participants to make their identifiability salient. Participants who were not identifiable were told that their responses were anonymous and therefore not traceable to them personally.

Following completion of the task, participants were administered a manipulation check questionnaire to verify that participants understood and believed their assigned levels of accountability, responsibility, and identifiability. Participants were then asked to give brief demographic information and were debriefed regarding the true purpose of the research. This debriefing included a request to participants to not share any information about the study with any other students. Participants were then given extra credit and allowed to leave.

Results

Manipulation Check Results

Because the previously noted hypotheses were of the greatest theoretical importance, multiple comparisons were planned to test these hypotheses. However, a number of problems occurred which precluded conducting these planned comparisons. Manipulation check results indicated that participants either did not believe the manipulation or did not answer the manipulation check questions carefully. Participants responded to four questions to verify the identifiability and responsibility manipulations embedded in the problem instructions. Responses to these questions were inconsistent, indicating that they could not be combined to produce reliable indicators of the manipulation effectiveness. Manipulation check questions were not used to verify the accountability manipulations because the manipulations could be verified by the actual behavior of the participants. However, two questions were included to assess the extent to which all participants, regardless of accountability condition, mentally justified their solutions as they generated them. Analysis of these questions indicated that participants in the no accountability condition reported spending significantly more time mentally justifying their solutions than participants in the accountability conditions.

In an attempt to most accurately test the premises outlined in this study, manipulation check results were used to isolate those participants who reported that they believed the manipulations.[1] Whereas isolation of participants that answered *both* manipulation check questions in accordance with their condition is most desirable, this criterion leads to a severely reduced data set. Therefore, one manipulation check question

[1] Analyses conducted with all participants were nonsignificant.

was chosen as an indicator of the effectiveness of each independent variable manipulation. Because it was speculated that participants may not have understood some of the words in the questions, items were chosen that were most clearly written and most closely resembled the manipulation instructions. Items number 1, 3, and 6 were chosen (Appendix D). For the identifiability manipulation, the item read, "The solutions and responses I have provided can be traced to me personally." For the responsibility manipulation, the item read, "The solutions and responses I have provided will be combined with solutions provided by other students, to be reviewed by the university." This item was reverse coded. To assess the accountability manipulation, the item read, "In generating solutions, I thought about whether or not my solutions could be defended as good solutions." Unfortunately, no items were given that discriminated between outcome and process accountability. Therefore, this question could only be used to determine whether significant differences in the amount of mental justification existed between accountable and unaccountable participants. For all items, participants responded on a 10-item scale (0 to 9), and higher numbers indicated greater perceived identifiability, responsibility, and accountability.

Isolated for analyses were the participants who responded to question 1, 3, and 6 of the manipulation check questionnaire in a direction consistent with their assigned condition (as determined by the midpoint of the scale). For example, participants assigned to the low identifiability condition who responded to question 1 with an answer less than or equal to 4 were retained in the low identifiability condition. Table 1 shows the breakdown of these results. For identifiability analyses, 180 participants remained (low

Table 1

Manipulation Check Results

Variable	n	M	SD	df	t
Identifiability[a]				178	31.45*
Low identifiability	111	1.19	1.14		
High identifiability	69	7.19	1.40		
Responsibility[b]				130	23.97*
Shared responsibility	73	1.88	1.44		
Sole responsibility	59	8.03	1.50		
Accountability[c]				157	26.93*
No accountability	38	1.13	1.65		
High accountability (Outcome/Process)	121	7.73	1.20		

Note. Higher mean scores indicate greater perceived identifiability, responsibility, and accountability.

[a] Item 1 was used for the identifiability manipulation check

[b] Item 3 (reverse coded) was used for the responsibility manipulation check

[c] Item 6 was used for the accountability manipulation check

*$p < .001$

identifiability, n = 111; high identifiability, n = 69). For responsibility analyses, 132 participants remained (shared responsibility, n = 73; sole responsibility, n = 59), and for accountability analyses, 159 participants were included (no accountability, n = 38; outcome accountability, n = 58; process accountability, n = 63). Again, no manipulation check questions were included to discriminate between the two types of high accountability, process and outcome, because participants were actually held accountable for their problem solving process (process accountability) or their problem solving outcome (outcome accountability).

After this data reduction, manipulation check results indicated significant differences across conditions for each of the independent variables. Table 1 also includes these results. Because significant differences in perceived identifiability, responsibility, and accountability were present, subsequent analyses including the dependent variables of interest were finally warranted.

Overview of Analyses Performed

Whereas the data reduction was necessary in order to only analyze information from participants who understood and believed the manipulations, this reduction precluded many of the planned comparisons due to the creation of cells with very few participants. Recall that most of the comparisons were chosen to assess interaction effects. For example, one contrast called for testing the differences between shared and sole responsibility under conditions of no accountability. Only 38 participants were retained in the no accountability condition, and the number of participants from this group that were *also* retained for the responsibility analyses was extremely low. Though there was

theoretical justification for the planned comparisons, such interaction analyses were virtually impossible to do. To prevent losing important information about the independent effects of identifiability, responsibility, and accountability on problem solving, omnibus F tests were performed on the remaining participants' data.

Because the reduced data resulted in unequal cell sizes, an alternate means of partitioning the sums of squares, known as analysis of unique sources, was used. According to Keppel (1991), this method uses a multiple regression approach to calculate sums of squares that reflect *only* the variability that is *uniquely* associated with a particular main effect or interaction. As a result, the sums of the various components will not add up to the total sums of squares, unless the design is balanced. Whereas this property of uniqueness is present in designs with equal cell sizes, it is not automatically present in unbalanced designs. This analysis of unique sources method of partitioning the sums of squares can be performed through the univariate MANOVA command in SPSS.

Univariate analyses of variance were conducted for each of the four dependent measures: (a) quantity of solutions, (b) the number of solutions generated with high resolving power, with high resolving power indicating a solution rated 4 and above on the 6-point resolving power scale, (c) the proportion of solutions with high resolving power relative to the total number of solutions generated, and (d) the rating of the solution with the highest resolving power. Table 2 includes the results of correlational analyses among these four outcome variables. Separate univariate analyses were conducted for each of the main and interaction effects, in order to retain the maximum amount of data. Note that different samples were used for these separate analyses, given that more data were

Table 2

Correlations Among Outcome Variables

	1	2	3	4
1. Quantity of solutions	--			
2. Number of Resolving Solutions	.64**	--		
3. Proportion of resolving solutions	-.19**	.53**	--	
4. Best Solution	.26**	.55**	.56**	--

Note. N=270; includes all participants who were retained for any analysis.
*p < .05 **p < .01

retained for the analyses of main effects. Tests of the interactions also included secondary sets of main effects analyses (with smaller n's) that were not interpreted. The results of these additional main effects analyses can be found in Appendix E. Tests for three-way interactions were impossible due to multiple cells containing one data point (See Appendix F for cell sizes). An alpha level of .05 was used for all statistical tests.

Quantity of Solutions

Tests of the assumptions of analysis of variance revealed that heterogeneity of variance was present for many solution quantity analyses (e.g., Bartlett-Box $F = 20.42$, $p < .0001$, for responsibility). An outlier ($z = 8.98$) was discovered that appeared to be creating significant differences in variability across a number of conditions. Cases with standardized scores in excess of 3.0 are regarded as potential outliers (Stevens, 1996; Tabachnick & Fidell, 1989).Whereas the presence of multiple outliers may call for transformation of the data to change the shape of the distribution from a skewed to a more normal distribution, the presence of a single outlier does not require such transformations (Tabachnick & Fidell, 1989). The deviant data point was removed and subsequent tests of the homogeneity assumption revealed that all heterogeneity was removed (e.g., Bartlett-Box $F = .01$, $p = .91$, for responsibility). Despite the removal of this outlier, no significant effects were found for solution quantity. Table 3 includes the results of the analyses of variance for solution quantity. Because each analysis includes different data, Tables 4 and 5 show the different means and standard deviations for the interaction analyses.

Table 3

Analysis of Variance Results for Quantity of Solutions as a Function of Identifiability Responsibility, and Accountability

Source	n	SS	df	MS	F	p
1. Identifiability	178	2.60	1	2.60	.41	.52
2. Responsibility	131	.70	1	.70	.13	.72
3. Accountability	159	11.92	2	5.96	.98	.38
4. Identifiability X Responsibility	77	2.48	1	2.48	.47	.49
5. Identifiability X Accountability	90	24.09	2	12.04	2.05	.14
6. Responsibility X Accountability	72	4.50	2	2.25	.35	.71

Table 4

Group Means and Standard Deviations for Quantity of Solutions

	Identifiability					
	Low			High		
	n	M	SD	n	M	SD
Responsibility						
Shared Respty	22	4.55	2.06	20	4.30	2.08
Sole Respty	22	4.82	2.32	13	5.31	2.84
Accountability						
No Accountability	10	4.40	2.07	7	3.14	2.80
Outcome Accountability	23	4.78	2.17	9	6.33	2.50
Process Accountability	21	5.10	2.57	20	4.65	2.54

Table 5

Group Means and Standard Deviations for Quantity of Solutions

	Responsibility					
	Shared			Sole		
Accountability	n	M	SD	n	M	SD
No Accountability	7	4.43	2.23	11	4.46	2.54
Outcome Accountability	16	5.19	2.69	10	6.10	2.23
Process Accountability	19	4.42	2.36	9	5.78	3.03

Number of Resolving Solutions

Heterogeneity of variance was once again revealed for many analyses for the number of resolving solutions. The same outlier that was previously removed for the solution quantity analyses was once again removed. All subsequent tests for the homogeneity of variance assumption were not significant, and it was therefore decided that there could be confidence in the results. Responsibility exerted a main effect on the number of resolving solutions, F (1,130) = 4.31, $p < .05$. Contrary to predictions, participants in the shared responsibility condition (M = 2.32, SD = 1.53) generated more highly resolving solutions than participants in the sole responsibility condition (M = 1.79, SD = 1.30). Table 6 includes a summary of the analyses of variance results, and Tables 7 and 8 show the means and standard deviations for the interaction analyses.

Proportion of Resolving Alternatives

Tests of the assumptions revealed that homogeneity of variance was present for all analyses for the proportion of resolving alternatives. One main effect and one interaction effect were found for proportion of resolving alternatives. Responsibility exerted a main effect on proportion of resolving alternatives, F (1, 130) = 4.85, $p < .05$. Contrary to predictions, participants in the shared responsibility condition (M = .50, SD = .27) generated a higher proportion of resolving alternatives than participants in the sole responsibility condition (M = .40, SD = .28). A significant interaction between identifiability and accountability was also found, F (2, 85)) = 4.61, $p < .05$. Simple effects tests revealed significant differences between levels of accountability under high identifiability, F (2, 85) =3.70, $p < .05$. Post-hoc comparisons using the Duncan test

Table 6

Analysis of Variance Results for Number of Resolving Alternatives as a Function of Accountability, Responsibility, and Identifiability

Source	n	SS	df	MS	F	p
1. Identifiability	178	.00	1	.00	.00	.99
2. Responsibility	131	8.81	1	8.81	4.31	.04
3. Accountability	158	2.64	2	1.32	.63	.54
4. Identifiability X Responsibility	77	.47	1	.47	.20	.65
5. Identifiability X Accountability	90	.30	2	.15	.09	.91
6. Responsibility X Accountability	72	1.72	2	.86	.40	.67

Table 7

Group Means and Standard Deviations for Number of Resolving Alternatives

	Identifiability					
	Low			High		
	n	M	SD	n	M	SD
Responsibility						
Shared Respty	22	2.32	1.49	20	2.15	1.73
Sole Respty	22	1.77	1.45	13	1.92	1.26
Accountability						
No Accountability	10	1.90	1.37	7	2.29	1.38
Outcome Accountability	23	2.09	1.04	9	2.78	1.40
Process Accountability	21	1.62	1.47	37	2.22	1.27

Table 8

Group Means and Standard Deviations for Number of Resolving Alternatives

	Responsibility					
	Shared			Sole		
Accountability	n	M	SD	n	M	SD
No Accountability	7	1.86	.90	11	2.00	1.55
Outcome Accountability	16	2.94	1.65	10	2.30	1.34
Process Accountability	19	2.32	1.34	9	1.78	1.79

revealed that highly identifiable but unaccountable participants (M = .87, SD =.23) generated a higher proportion of resolving solutions than highly identifiable participants in either outcome or process accountability conditions (M = .46, SD =.30; M = .60, SD =.29, respectively). No other significant effects were found for proportion of resolving alternatives. Table 9 includes a summary of the analyses of variance results and Tables 10 and 11 show the means and standard deviations for the interaction analyses.

Best Solution

Tests of the assumption of homogeneity of variance revealed that significant heterogeneity of variance was present for the identifiability and accountability interaction (Bartlett-Box F =3.06, p <.01). However, because heterogeneity of variance increases the likelihood of type I error (Keppel, 1991) and this interaction effect was not significant, no changes were made to attempt to eliminate this instance of heterogeneity of variance. A main effect was found for accountability on best solution, F (2,155) = 11.77, p <.05. Contrary to predictions, post-hoc comparisons using the Duncan test revealed that unaccountable participants (M = .4.61, SD =1.15) and outcome accountability participants (M = 4.52, SD =1.08) each generated higher quality best solutions than participants in the process accountability condition (M = 4.0, SD =1.38). No other effects were significant for the best solution index of solution quality. Table 12 includes a summary of the analyses of variance results and Tables 13 and 14 show the means and standard deviations for the interaction analyses.

Table 9

Analysis of Variance Results for Proportion of Resolving Solutions as a Function of Accountability, Responsibility, and Identifiability

Source	n	SS	df	MS	F	p
1. Identifiability	179	.11	1	.11	1.30	.26
2. Responsibility	132	.36	1	.36	4.85	.03
3. Accountability	159	.10	2	.10	.62	.54
4. Identifiability X Responsibility	78	.00	1	.00	.00	.97
5. Identifiability X Accountability	91	.67	2	.33	4.61	.01
6. Responsibility X Accountability	73	.18	2	.09	.97	.39

Table 10

Group Means and Standard Deviations for Proportion of Resolving Solutions

	Identifiability					
	Low			High		
	n	M	SD	n	M	SD
Responsibility						
Shared Respty	22	.49	.20	20	.54	.35
Sole Respty	23	.39	.27	13	.43	.30
Accountability						
No Accountability	11	.42	.23	7	.87	.23
Outcome Accountability	23	.50	.27	9	.46	.30
Process Accountability	21	.33	.27	20	.59	.29

Table 11

Group Means and Standard Deviations for Proportion of Resolving Solutions

	Responsibility					
	Shared			Sole		
Accountability	n	M	SD	n	M	SD
No Accountability	7	.46	.25	12	.49	.36
Outcome Accountability	16	.60	.31	10	.38	.24
Process Accountability	19	.54	.26	9	.36	.37

Table 12

Analysis of Variance Results for Best Solution as a Function of Accountability, Responsibility, and Identifiability

Source	n	SS	df	MS	F	p
1. Identifiability	179	.60	1	.60	.37	.55
2. Responsibility	132	4.31	1	4.31	2.60	.11
3. Accountability	159	11.77	2	5.89	3.93	.02
4. Identifiability X Responsibility	78	.28	1	.28	.17	.68
5. Identifiability X Accountability	91	2.89	2	1.45	1.24	.29
6. Responsibility X Accountability	73	1.77	2	.89	.59	.56

Table 13

Group Means and Standard Deviations for Best Solution

	Identifiability					
	Low			High		
	n	M	SD	n	M	SD
Responsibility						
Shared Respty	22	4.27	1.39	20	4.55	1.05
Sole Respty	23	3.78	1.41	13	4.31	1.18
Accountability						
No Accountability	11	4.54	1.24	7	5.43	.54
Outcome Accountability	23	4.65	.71	9	4.67	1.12
Process Accountability	21	3.71	1.49	20	4.50	.95

Table 14

Group Means and Standard Deviations for Best Solution

	Responsibility					
	Shared			Sole		
Accountability	n	M	SD	n	M	SD
No Accountability	7	4.86	.38	12	4.42	1.44
Outcome Accountability	16	4.63	1.26	10	4.50	.97
Process Accountability	19	4.11	1.33	9	3.22	1.30

Exploration of Low F Values

In theory, F values should be equal to 1 when there are no effects and should never be less than 1. However, a number of F values were calculated that were less than 1, suggesting a potential inadequacy in the underlying model being used to represent the data (Shine, 1982). Shine recommends testing the significance of such left-tailed F-ratios by taking their reciprocals and reversing the degrees of freedom. The central F distribution can then be used to test the significance of these values in the normal manner. All analyses resulted in a critical values of $F_{75,1}$ of 253, for identifiability and responsibility analyses or $F_{100,2}$ of 19.49, for accountability analyses. The reciprocals of these values are .004 and .05. Thus, any calculated F values which are below these critical values should be questioned. Of the 16 results with F's less than one, two were statistically significantly less than 1: (a) the effect of identifiability on the number of resolving alternatives, and (b) the effect of identifiability and responsibility on the proportion of resolving solutions. In these two cases, it may be that some other unknown factor is operating to create effects that, when unmeasured, are relegated to the error term. Thus, the null results obtained for these two analyses are particularly suspect.

Discussion

Overview

The primary goal of this thesis was to explain solution quality for an ill-defined problem as a function of three motivational variables: identifiability, responsibility, and accountability. The basic assumption is that these variables will cause people to work harder than they might otherwise work. This extra effort was expected to translate into enhanced performance in the form of higher solution quality. More specifically, this study was designed to tease apart the independent effects of these three motivational variables as well as examine how they act together to jointly affect the amount of effort a person is willing to put forth toward the task of solution generation.

The following discussion will begin with a reminder of the methodological limitations and cautions for interpretation, followed by a summary of the findings, both predicted and unexpected. Some potential interpretations of the findings will be offered, along with limitations for theoretical and applied generalizability. Lastly, implications for theory and practice as well as suggestions for future research are offered.

Methodological Limitations

The most important methodological constraint is that a large amount of data was lost in an attempt to most accurately test the premises outlined in this study. The manipulation check questions designed to assess the effectiveness of the manipulations were not answered reliably, making it difficult to determine whether participants really experienced their assigned conditions. One manipulation check question was chosen as an indicator of the effectiveness of each independent variable manipulation, and participants

who reported that they believed the manipulation were isolated for analysis. In other words, participants who, though exposed to a particular manipulation, did not report belief in that manipulation were excluded from analyses for that variable. It is possible that different manipulation check questions may have isolated a different group of participants, for which different results may have been found.

In addition to the concern about which participants were removed from analyses, it is also important to address the number of participants removed from analyses. Chi-square tests revealed that significant differences in participant loss existed for tests of each of the main effects (X^2 =13.79, p <.001; X^2 =4.12, p <.05; X^2 =8.12, p <.05, for identifiability, responsibility, and accountability, respectively). These results suggest that subject loss may not have occurred randomly for these tests, and thus, the advantage of random assignment may have been eliminated. Chi-square tests for participant loss for tests of the interactions were not significant, suggesting that there was no differential loss of data in these conditions. Whereas random assignment may have been protected for the interaction analyses, the absolute loss of data was such that the resulting cell sizes were relatively small. The small sample sizes may have reduced the power of the experiment to detect significant differences. However, significant results that occurred in spite of these power limitations should be interpreted as relatively trustworthy, provided it can be concluded that the appropriate participants were retained for analysis.

Despite the methodological limitations imposed by the data loss, the manipulations used in this study are largely consistent with other research on identifiability, responsibility, and accountability. However, the manipulations used here were free from

the confounds that are often present in many other studies on these variables and may serve to clear up some of the confusion surrounding results in this domain. In addition, the operationalization of process and outcome accountability was new and may serve to expand the research on accountability. Because this operationalization of accountability is new and very specific, generalizability is therefore limited to the process and outcome of solution generation only. Other means of measuring processes and outcomes should be distinguished from the methods used here.

In general, the hypotheses were unsupported, and a number of unexpected results occurred. These methodological constraints notwithstanding, the results which follow may represent real differences in the effects of the levels of identifiability, responsibility, and accountability in the solution generation context.

Summary of Results for Predictions

Effect of accountability on solution quality. Hypotheses 1 and 2 predicted a main effect of accountability on solution quality with accountability (both process and outcome) leading to higher solution quality than no accountability and with process accountability leading to higher solution quality than outcome accountability. The logic is that accountability leads to more effortful cognitive processing and will therefore result in higher solution quality than no accountability. In addition, if the quality of the solutions from which individuals must choose is high, then the probability of a chosen alternative being a good one increases. Therefore, one would predict that making participants accountable for their solution generation process will result in higher quality solutions than making participants accountable for their solution generation outcome. The predictions

described in Hypotheses 1 and 2 required planned comparison analyses. However, recall that due to the loss of data, omnibus F-tests were conducted instead. Hypotheses 1 and 2 were not supported for any measures of solution quality.

Effect of responsibility and accountability on solution quality. Hypothesis 3 predicted an interaction between responsibility and accountability, with participants in both levels of responsibility under high accountability generating higher quality solutions than participants in either shared or sole responsibility conditions under no accountability. In addition, hypothesis 3 predicted that under no accountability, solution quality would be higher under sole responsibility than shared responsibility under no accountability. Unfortunately, the reduction in data precluded significance testing of these specific planned comparisons. However, the implication of these hypotheses from an omnibus F approach is that that although it has been typically shown that shared responsibility results in reduced levels of effort relative to sole responsibility, it was expected that accountability would serve to moderate the effect of responsibility on solution quality by eliminating the differences in effort across responsibility conditions. No significant interactions between responsibility and accountability were revealed as a result of omnibus F-tests. Thus, Hypothesis 3 was not supported for any solution quality measures.

Effect of identifiability and responsibility on solution quality. Hypothesis 4 predicted an interaction between identifiability and responsibility, such that under low identifiability, sole responsibility would yield higher quality solutions than shared responsibility. Under high identifiability, these differences would be eliminated and solution quality would not

differ across conditions of shared and sole responsibility. Hypothesis 4 was testable, but not supported for any of the solution quality measures.

Summary of Unexpected Findings

Effect of accountability on best solution. A significant main effect of accountability on the quality of the best solution was found. Recall that a main effect of accountability was predicted by Hypotheses 1 and 2, which predicted that accountability (process and outcome) would lead to higher quality than no accountability. In addition, process accountability was predicted to lead to higher quality than outcome accountability. Contrary to these predictions, unaccountable participants and outcome accountability participants each generated higher quality best solutions than participants in the process accountability condition. Because the comparisons were aposteriori, the complex contrast between accountable (process and outcome combined) and unaccountable participants could not be tested.

Effect of responsibility on solution quality. Although specific hypotheses regarding the main effects of responsibility were not made, the predicted effects of responsibility on solution quality were nonetheless implicit. Recall that previous research in social psychology has generally shown that when individuals perceive themselves to be part of a group, they reduce the amount of effort they expend, relative to individuals who are solely responsible. A hypothesis based on this previous research would predict that participants in the sole responsibility condition would generate higher quality problem solutions than participants in the shared responsibility condition, as a reflection of the reduced effort exhibited by shared responsibility participants.

A significant difference between sole and shared responsibility was found for both the number and proportion of resolving alternatives. However, contrary to predictions, participants in the shared responsibility condition generated a higher number of resolving alternatives and a greater proportion of resolving alternatives than participants in the sole responsibility condition.

Although a few hypotheses contained predictions that shared and sole responsibility performance would be equal as a function of an interaction, never was there a prediction that included *higher* performance among participants who shared responsibility relative to those who were solely responsible. It is worth noting that examination of the means for the nonsignificant interaction of responsibility and accountability suggest that this main effect of responsibility may be driven by differences in responsibility among high accountability (both process and outcome) participants only. Clearly, this is a matter of speculation based on observance of the means. This possibility nonetheless offers insights for future research.

Effect of identifiability and accountability on proportion of resolving alternatives. As was the case for the main effect of responsibility, no specific hypotheses were made regarding the joint effects of identifiability and accountability on solution quality. No previous work has assessed the combined effects of identifiability and accountability on any variable; rather, most work has confounded the two variables by making unaccountable participants anonymous and accountable participants identifiable. This study was designed, in part, to tease apart the effects of these two variables.

The predicted effect of accountability on solution quality has already been discussed. Previous work on identifiability and solution generation has shown that when individual outputs are identifiable, people generate more high quality solutions than individuals whose solutions are unidentifiable (Scherer, 1985). Again, no specific predictions were made about the joint effects of these two variables.

A significant interaction was found between identifiability and accountability for proportion of resolving alternatives. Under low identifiability conditions, there was no effect of accountability on solution quality. However, under high identifiability, unaccountable participants generated a higher proportion of resolving solutions than participants in either outcome or process accountability conditions.

Interpretation of Findings

Effect of accountability on solution quality. Recall that accountability had an unexpected effect on the quality of the best solution, such that unaccountable participants and outcome accountability participants each generated higher quality best solutions than participants in the process accountability participants. Recall also that all participants were asked to generate as many solutions as possible to the problem and to choose the solution they felt was best. Outcome accountability participants were asked to provide a written justification for why they thought the chosen solution was the best one. Although no mention of justification was made to unaccountable participants, both unaccountable and outcome accountability participants received instructions which suggested that the 'best solution' was the most important criterion. Process accountability participants, however, were asked to provide a written justification for *each* of their solutions. These participants

received instructions which indicated that all of the solutions served as important criteria. Thus, unaccountable and outcome accountability participants received instructions suggesting one single criterion, whereas process accountability received instructions suggesting multiple criteria.

These differences in instructions may appear to be very subtle. However, evidence from previous research suggests that subtle details in accountability instructions may have the potential to alter behavior in significant ways. Weldon and Gargano (1988) told accountable participants that they would be contacted to share what information they used to make their judgments in a multiattribute decision making task and why they used this information. Results showed that accountability increased the amount of information searched, but not the consistency with which the information was processed, both of which are indicators of cognitive effort. As was previously discussed, the authors speculated that because the instructions implied that participants would be accountable for which dimensions they used and how the dimensions influenced judgment, participants may have been less concerned with consistency in judgment and more concerned with what information they used to arrive at a judgment.

In the same vein, it is speculated here that because unaccountable and outcome accountability participants were instructed to focus on their choice of best solution, they were more likely to focus on the quality of one solution than process accountability participants, who were asked to focus on every solution they could generate. For process accountability participants, a cognitive resource limitation may have been operating to cause participants to diffuse effort across the entire solution set. The end result of this

cognitive resource deficit is that no one solution received concentrated attention or effort. Contrary to process accountability participants, unaccountable and outcome accountability participants were not operating under cognitive resource limitations and were able to generate higher quality best solutions than process accountability participants.

Effect of responsibility on solution quality. The majority of previous research on responsibility has shown that people who are solely responsible tend to perform better than people who share responsibility with others. Such performance differences are explained by the fact that people who share responsibility tend to reduce the amount of effort they exert. This study found that people who believed they shared responsibility for solution generation performed better than people who believed they were solely responsible for solution generation. Two other studies found similar effects that might shed light on the question of why shared responsibility may lead to enhanced performance over sole responsibility.

In a series of experiments on the effects of various types of responsibility and identifiability on recall in a decision making task, Price (1987) similarly identified a situation in which shared responsibility participants recalled more information concerning a decision they made correctly than sole responsibility participants. However, this effect was only evident for unidentifiable participants. Similar to the current study, the participants' responses to the decision task were actually going to be used, making the task meaningful to participants. Price suggested that in the absence of identifiability, participants in the sole responsibility group *decreased* their efforts. Because participants in shared responsibility groups are accustomed to at least some amount of anonymity, the

lack of identifiability did not alter performance. In addition, it was suggested that participants who shared responsibility with others may have felt a sense of responsibility to the other groups members to work hard to achieve their assigned goal.

It is important to note that whereas the participants' decisions were pooled, each decision was important because the decisions were tallied to result in a majority vote decision. Unlike many group efforts where individual inputs may have reduced impact, every individual in this study made a unique contribution to the final outcome. Research previous and subsequent to Price's (1987) study suggests that when participants do *not* believe that their contribution represents unique input, they reduce their efforts (Harkins & Petty, 1982; Weldon & Mustari, 1988). Weldon and Mustari suggest that degree of felt dispensability may account for cognitive loafing in shared responsibility situations. Participants who shared responsibility for a multiattribute judgment task exerted less effort and felt more dispensable than participants working alone. Furthermore, Harkins and Petty indicate that this degree of perceived dispensability can be reduced for difficult or challenging tasks, toward which participants are more likely to feel they can make a unique contribution.

Together these studies suggest that when participants feel they are making a unique contribution, they may work hard in spite of anonymity or shared responsibility. However, this logic would predict that when all participants feel their contributions are unique, either because individual or collective output influences the outcome or because the task is challenging, there will be *no* differences between sole and shared responsibility.

A study by Harkins and Jackson (1985) provides one more piece of the puzzle to explain why shared responsibility might lead to better performance than sole responsibility. Harkins and Jackson discovered that when participants believed their own performance on a brainstorming task could be directly compared with others' performance, they were likely to generate more uses for an object than participants who believed they were the only ones working on that specific object. Comparability was manipulated by telling participants that the object for which they would be generating uses was the same as or different from objects given to other participants. Furthermore, all participants were told that the number of uses they generated was comparable only to the number generated by others working on the same object. In other words, it was made salient that comparability was only possible for those working on the same object.

In the current study, responsibility was confounded with comparability, as defined by Harkins and Jackson. Participants who shared responsibility believed their responses would be pooled with responses of others working on the same problem. Participants who were solely responsible believed other participants were working on a different problem. Given the results discovered by Harkins and Jackson, it is possible that the perception that a person's solutions could be compared with others may have compelled participants in the shared responsibility condition to outperform participants working alone.

Effect of identifiability and accountability on solution quality. The interaction between identifiability and accountability for proportion of resolving alternatives revealed that highly identifiable but unaccountable participants generated a higher proportion of resolving solutions than highly identifiable participants in either outcome or process

accountability conditions. A number of points are important here. The first point worth highlighting is that accountability had no effect in the absence of identifiability. Recall that almost all previous accountability research has confounded identifiability and accountability. Therefore, any significant effects of accountability have been the result of a manipulation that contained both identifiability and justification components. This study assessed the independent effects of identifiability and justification, and the results suggest that identifiability is in fact an important, yet often overlooked, component of accountability. Justification in the absence of identifiability failed to influence the overall solution set quality in a significant way.

The second important conclusion from these results is that, contrary to much previous research on accountability, people who are accountable may have poorer performance than people who are not accountable. Only on a few occasions has this effect been shown before. Given that accountability has a tendency to cause people to be more vigilant information processors, it may be that accountable participants attempted to use *all* of the information presented in the problem to generate solutions. The problem (Appendix A) describes the difficulty associated with finding a parking spot on campus, especially in the morning hours when a lot of students attend classes. In addition to describing the main constraints of maintaining good community relations, operating within the university budget, and allowing the students to get to class in a timely and hassle-free manner, the problem also includes a rather lengthy discussion about the possibility of building an access road through the park to ease traffic congestion. Given the essential conflict just discussed, this information does not seem particularly useful or relevant to

creating more available parking spots. Previous research has shown that when accountability is introduced, people tend to think in more integratively complex ways about *ir*relevant information as well as relevant information (Tetlock & Boettger, 1989). Attempts to integrate this information about building a road may have led accountable participants to generate some solutions that focused on this aspect of the problem, even though the option of building a road was not important information for successfully solving the problem. A consistent tendency for accountable participants to generate solutions based on irrelevant information may have led to a decreased proportion of resolving alternatives relative to unaccountable participants. Research assessing the types or categories of solutions as a dependent variable may reveal whether accountable participants are more likely to generate solutions that address irrelevant aspects of the problem.

Task effects. Previous research assessing the characteristics of the parking problem and other ill-defined problems has indicated that the parking problem is highly involving for problem solvers (sampled from university students) (Scherer, Butler, Reiter-Palmon, &Weiss, 1994). Moreover, anecdotal evidence collected by the researcher suggests that many participants were very concerned about and engaged in the problem. Several participants continued to talk about the problem and potential solutions with the experimenter after the experiment was over. Together this information suggests that the problem may have induced a great deal of motivation in problem solvers, independent of the experimental manipulations.

Brickner, Harkins, and Ostrom (1986) found that typical differences in performance as a function of identifiability are eliminated when a task is personally involving. Brickner et.al. manipulated identifiability and personal involvement and found that under low identifiability, participants displayed social loafing and generated fewer thoughts in reaction to a proposal than participants in a high identifiability condition. However, when the proposal included plans that would affect the participants directly, these differences in performance disappeared. Apparently, the highly involving nature of the task motivated participants enough to overcome the effort reduction that usually accompanies anonymity.

The parking problem may have motivated the participants in this study in a manner similar to the highly involving task used by Brickner et.al (1986). All participants in this study believed their results would be reviewed by university employees in an attempt to resolve the problem. In addition, because the participants were students, it is likely that they felt directly affected by the problem. If participants' motivation was enhanced because of the personally-involving nature of the task, there may have been less room for other variables such as identifiability, responsibility, and accountability to exert a motivational influence.

Another characteristic of the task that may have influenced the results of this experiment is the degree of task complexity. Relative to simple tasks requiring physical effort or cognitive tasks requiring expression of opinions, an ill-defined problem scenario with conflicting objectives can be regarded as a relatively complex task. Ill-defined problems do not have one right answer, allow for multiple means of solving the problem, and often contain irrelevant information in addition to relevant information. Such task

complexity has been shown to moderate the effect of motivational variables on performance. Harkins and Petty (1982) demonstrated that when participants in a shared responsibility condition performed a task that was particularly challenging, performance was equal to that of sole responsibility participants. Follow-up studies revealed that when the task was challenging, participants felt that their responses represented a unique contribution unlikely to be duplicated by other persons. This perceived influence over outcomes caused participants who shared responsibility to exert just as much effort as participants who were solely responsible.

The most important implication of such research is that the task complexity moderated the effect of a motivational variable on performance. It is possible that the parking problem may have exerted similar influences, and these potential effects cannot be explored in this study. Both task involvement and task complexity were design constants in this study; it is possible they may have operated as moderators of the effects of identifiability, responsibility, and accountability on performance.

Limitations

As the previous discussion indicates, other types of problems and other types of cognitive tasks may lead to different results. Important task effects on problem solving performance have been identified in the past, and it is speculated that such effects are too often overlooked. The personally-involving nature of the problem and the degree of task complexity have been suggested as possible moderators of the effects of motivational variables on performance. Other task characteristics may also influence the effects of identifiability, responsibility, and accountability on solution quality.

The participants used in this study can be regarded as novice problems solvers. The results should not be extended to research conducted on more experienced problem solvers, who have been known to perform very differently from novices in the problem solving domain. For example, experts can more readily identify the most important aspects of a problem and are less distracted by irrelevant surface features than novice problem solvers. This characteristic of experts suggests that experts may be less susceptible to the dilution effect of accountability. Recall that the dilution effect refers to the tendency for accountable people to integrate irrelevant as well as relevant information into a solution. Other differences between novices and experts may also moderate the effect of identifiability, responsibility, and accountability on solution quality.

Lastly, recall that the measure of solution quality used here was resolving power, or the degree to which the solutions successfully resolved the conflicting aspects of the problem. Other measures of solution quality include how appropriate or original the solution is, for example. The results are limited to resolving power and may differ for creativity or other measures of decision quality.

Implications and Future Research

An extensive review of the research on identifiability, responsibility, accountability, and performance illustrates quite clearly that a great deal of attention has been given to the topic of how to motivate people to exert increased effort on both physical and cognitive tasks. This line of research exists in response to the well-documented tendency for people to be physically and cognitively lazy, especially when they perceive that they share efforts with others. Identifiability, responsibility, and accountability have been identified as

possible means of decreasing these tendencies to be a cognitive miser or to diffuse responsibility among members of a group. Although these motivational variables have been recognized as a means of overcoming miserly tendencies, very little research has addressed the effect of motivational variables on problem-solving performance, especially performance on ill-defined problems. For example, identifiability and responsibility research primarily includes physical and low-level cognitive tasks, such as shouting and opinion expression. Though accountability research tends to focus more consistently on cognitively challenging tasks, such as impression formation, opinion expression, judgment, and decisions, no study prior to the present one has examined accountability influences on solution generation for ill-defined problems.

People regularly face ill-defined problems that elicit feelings of uncertainty and hesitation because no one correct answer exists. In the absence of empirical evidence to guide managers, unfounded prescriptions about how to motivate problem solvers to successfully solve these complex problems are followed. The prescriptions can be ineffective at best and harmful at worst. For example, within business contexts, it is commonly assumed that making all employees highly accountable and responsible for their actions will automatically elicit better performance from those employees. This prevalent notion has not been empirically supported thus far. In general, the current line of research on motivational influences on cognition and behavior must be expanded to include problem solving tasks, a domain which has heretofore been overlooked.

It is not yet clear how making an individual's output identifiable affects the quality of the individual's problem solving process or final solution. Scherer (1985) found that when

outputs are identifiable, people generate more solutions to a problem than when their outputs are anonymous. However, solution quality was only improved when the problem was relatively simple. Results of the current study did not replicate the quantity effect found by Scherer but may lend support for the quality effect. Because the parking problem contains multiple conflicting objectives, such that satisfaction of one objective tends to preclude the satisfaction of other objectives, it may constitute a difficult problem. The task complexity may have eliminated the impact of identifiability on performance. Future research should include problems that vary in difficulty, perhaps in the degree to which problem objectives conflict with one another. It may be, however, that successful performance on ill-defined problems is inherently challenging and therefore not susceptible to the influence of identifiability.

It is not yet clear how requiring employees to share responsibility within a team environment affects the quality of decisions made by individual members or the team as a whole. If the results found here represent reality, such that people who share responsibility outperform people who are solely responsible, the use of responsibility as a motivational variable has important implications for small groups and teams. If problem solvers are inclined to exert more effort when they share responsibility, either because of social evaluation fears, competition, or the desire to achieve a group goal, then the use of teams may be an important means of enhancing performance.

Future research should replicate this study, perhaps with more realistic groups instead of nominal groups. Research with intact groups or newly formed groups that actually work together will contribute to the literature on responsibility, nominal groups,

and teams. Whereas small group performance has been addressed, less is known about work teams where members work somewhat independently and then combine their efforts.

Even less is known about the importance of group size on problem solving performance. What happens when three employees share responsibility for a problem? What happnes when ten people share this same responsibility? Future research should take into account possible differences in diffusion of responsibility as a function of group size.

Recall that a relationship between responsibility and accountability on solution quality was not found. However, further examination of these nonsignificant results appeared to indicate that responsibility resulted in performance differences only among participants who were highly accountable. Though this possibility could not be tested post-hoc, future research should specifically examine whether accountability moderates the effect of responsibility on solution quality. It is conceptually plausible that high accountability, for either a process or an outcome, could do more than simply eliminate differences between people who share responsibility and those who do not. That is, accountability could also motivate people who share responsibility to exert a higher level of effort, especially if individuals feel accountable to other group members.

Because empirical work has shown that people generally reduce their efforts when they share responsibility, the results of this study may have interesting implications for applied settings. It is important to find prescriptions to overcome the effects of social loafing. Accountability offers a potential avenue for improving individual effectiveness in a team context.

It is not yet clear how requiring someone to justify their problem solving affects the quality of those solutions. Furthermore, does it matter whether the person is accountable for the process used to arrive at a solution or simply for the final solution? The importance of a process and outcome distinction in problem solving has yet to be determined. The results of this research suggest that making problem solvers accountable for their solution generation process or final solution will not necessarily enhance the quality of the solutions they generate. Siegal-Jacobs and Yates (1996) successfully demonstrated that making people accountable for a judgment procedure was superior to the method of making them accountable for the outcome of the judgment. In this study, participants had to make a probability judgment regarding the likelihood that an individual held a particular attitude, based on background information about the individual. Participants accountable for their judgment procedure were told that they would later be interviewed to determine why and how certain information was used to arrive at a probability judgment. Participants accountable for the outcome of the judgment were told that they would be given feedback regarding the accuracy of their judgment (true values were known) and that the top five performers would receive a bonus prize for accuracy. Although Siegal-Jacobs and Yates defined process and outcome accountability in a different manner from this study, both studies highlight the importance of different types of accountability. Future research should further examine such subtle differences in the way types of accountability influence decision making behavior. It is suggested that a stronger manipulation of process accountability be used in the future because the operationalization of process accountability used here was somewhat weak. Either a more well-defined process could be

utilized or, in the domain of problem solving, participants could be asked to justify their solutions by explaining what information they used to generate a solution and why they used the information that they did.

It is especially interesting to note that accountability exerted no effect on solution quantity. Given that accountability was the only variable manipulation that was verified by actual behavior, there can be no doubt about the effect of the manipulation. Despite the labor involved in providing written justification for a list of solutions, accountable participants neither decreased nor increased their solution quantity in anticipation of the justification. It may be that individuals varied in their reactions, such that some people focused more on providing a long list of solutions, whereas others focused on ensuring that the list was justifiable.

An especially important contribution of this study is the evidence that identifiability may moderate the effect of accountability on performance. In the presence of identifiability, unaccountable participants generated a higher proportion of resolving solutions than participants accountable for either the outcome or the process. Typical research on accountability includes both an identifiability and justification component. This study suggests that the identifiability component is equally important to the justification component for motivating behavior. The good news is that justification is usually accompanied with identifiability in every day life. Justification with anonymity is probably rare in the workplace, suggesting that the use of justification to improve performance in such applied environments may prove to be a desirable practice.

Whereas the task in this study has been described as highly involving, it is possible that even this task is too artificial to generalize to the workplace. Though participants were told, and it indeed was a reality that university officials were actually given the solutions, there were no immediate consequences for the participants. However, it is not clear how much consequentiality was perceived by the participants. Some people may assume that being required to justify a decision means that there are automatically consequences to the decision. The every day use of the word accountability may bring up notions of responsibility, consequentiality, ownership of outcomes, etc. Although this study only used the word 'justification' and not 'accountability', other research should address the different possible interpretations of both the concept and manipulation of accountability and how these interpretations may alter performance. In addition to addressing the degree of perceived consequentiality, future research should consider the role of evaluation apprehension. Because participants did not have to face the people who were reviewing their solutions, perhaps the social evaluation in this study may have been too far removed. Or it is also possible that too much evaluation apprehension can act to hinder performance, such that very high accountability or responsibility will cause participants to be less creative or thoughtful. In these cases, less accountability may enhance performance because there is less apprehension interfering with performance. Future research should include both measuring individuals' level of evaluation apprehension and varying the situations to include more immediate and proximal, as well as distal, evaluation.

Accountability research has shown important differences in the effect of accountability on performance as a function of the individual to whom participants are accountable. Future research in problem solving should include contexts similar to the work environment, where expected justification is more personal and generally requires a face-to-face encounter and where decision outcomes are more immediate and personally consequential.

Although no specific predictions were made regarding the effect of identifiability, responsibility, and accountability on solution quantity, it is nonetheless surprising that there were no significant effects in any direction for any variable for solution quantity. One possible explanation for these null results points to the solution generation instructions given to all participants. Initial problem instructions asked participants to generate as many solutions to the problem as they could. Whereas these instructions were intended to cause participants to generate multiple solutions instead of just providing one final solution, the instructions may have caused all participants to focus on solution quantity, much like the instructions often given for brainstorming. Other research on social loafing, however, has shown that differences between shared and sole responsibility performance exist in spite of brainstorming instructions. Harkins and Petty (1982) gave explicit brainstorming instructions to all participants and still found that participants in the sole responsibility condition outperformed participants in the shared responsibility condition in the quantity of uses generated for an object.

Much of the previous discussion indicated that more attention should be paid to the solution generation instructions given in the future, given that these instructions may have

the potential to moderate the effects of many variables on solution generation. Instructions to brainstorm, focus on quantity, or focus on quality should be manipulated instead of used as a design constant because it is not clear whether instructions may serve to motivate participants in differential ways, independent of any other interventions.

In addition to the direct effects of motivational variables such as identifiability, responsibility, and accountability, future research must continue attempts to identify the joint effects of these variables as well as direct attention to individual difference, task, and situational moderators. Do people vary in their response to anticipated evaluation? Do some people perceive accountability as a threatening, and therefore anxiety-producing, influence? Do others perceive accountability as a challenge they aspire to meet? What about individual differences in need for cognition, intelligence, and expertise? How do these motivational variables affect individuals who have a proclivity to perform well in the first place? How is performance affected by an important and highly involving task? How does task complexity affect performance? Does it matter whether an individual is accountable to a peer or to a superior? All of these questions and many more must be addressed if we expect to offer valuable contributions to the literature on motivation, problem solving, and small groups and to advise practitioners interested in improving problem solving performance within their organizations.

Clearly, the nature of the interactions among identifiability, responsibility, and accountability remain unclear. It is important to note, however, that this study does not suggest that having more motivational influences is always better. Whereas one motivational influence at a time may enhance performance, additional influences do not

appear to have an additive effect. It may be that a moderate level of identifiability, responsibility, and accountability is required to maximize performance. Too much responsibility and accountability may have the potential to induce high arousal and anxiety, neither of which facilitate performance, especially during difficult tasks. These variables appear to interact in a complicated way, and an easy solution is not yet on the horizon.

References

Abelson, R. P., & Levi, A. (1985). Decision making and decision theory. In G. Lindzey & E. Aronson (Eds.), The Handbook of Social Psychology, (3rd ed., Vol, 1, pp. 231-310). New York: Random House.

Adelberg, S., & Batson, C. D. (1978). Accountability and helping: When needs exceed resources. Journal of Personality and Social Psychology, 36 (4), 343-350.

Arkes, H. R., Christensen, C., Lai, C., & Blumer, C. (1987). Two methods of reducing overconfidence. Organizational Behavior and Human Decision Processes, 39, 133-144.

Beach, L.R., & Mitchell, T.R.(1978). A contingency model for the selection of decision strategies. Academy of Management Review, 3, 439-449.

Brickner, M.A., Harkins, S.G., & Ostrom, T.M. (1986). Effects of personal involvement: Thought-provoking implications for social loafing. Journal of Personality and Social Psychology, 51, 763-769.

Butler, A.B. (1995). The effect of structuring aids on the quality and quantity of solutions generated to ill-structured problems: A comparison of expert and novice performance. Unpublished doctoral dissertation, University of Nebraska, Lincoln, Ne.

Cacioppo, J. T., & Petty, R. E. (1981). Social psychological procedures for cognitive assessment: The thought-listing technique. In T. V. Merluzzi, C. R. Glass, and M. Genest (Eds.), Cognitive assessment. New York: Guilford Press.

DeMatteo, J. S., Dobbins, G. L., & Lundby, K. M. (1994). The effects of accountability on training effectiveness. Academy of Management, 37, 122-126.

Hagafors, R., & Brehmer, B. (1983). Does having to justify one's judgments change the nature of the judgment process? Organizational Behavior and Human Performance, 31, 223-232.

Harkins, S.G., & Jackson, J.M. (1985). The role of evaluation in eliminating social loafing. Personality and Social Psychology Bulletin, 11 (4), 457-465.

Harkins, S.G., & Petty, R.E. (1982). Effects of task difficulty and task uniqueness on social loafing. Journal of Personality and Social Psychology, 43, 1214-1229.

Herek, G. M., Janis, I. L., & Huth, P. (1987). Decision making during international crises. Journal of Conflict Resolution, 31 (2), 203-226.

Keppel, G. (1991). Design and analysis: A researcher's handbook (3rd ed.).Englewood Cliffs, NJ: Prentice Hall.

Latane, B., Williams, K., & Harkins, S. (1979). Many hands make light work: The causes and consequences of social loafing. Journal of Personality and Social Psychology, 37, 822-832.

McAllister, D. W., Mitchell, T. R., Beach, L. R. (1979). The contingency model for the selection of decision strategies: An empirical test of the effects of significance, accountability, reversibility. Organizational Behavior and Human Performance, 24, 228-244.

McKechnie, J. L et al (Eds.) (1983). Webster's new universal unabridged dictionary (2nd ed.). New York: Simon & Schuster.

Murphy, R. (1994). The effects of task characteristics on covariation assessment: The impact of accountability and judgment frame. Organizational Behavior and Human Decision Processes, 60, 139-155.

Nisbett, R. E. & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. Psychological Review, 84 (3), 231-259.

Pitz, G. F., Sachs, N. J., & Heerboth, J. (1980). Procedures for eliciting choices in the analysis of individual decisions. Organizational Psychology and Human Performance, 36, 348-361.

Price, K.H. (1987). Decision responsibility, task responsibility, identifiability, and social loafing. Organizational Behavior and Human Decision Processes, 40, 330-345.

Rozelle, R. M., & Baxter, J. C. (1981). Influence of role pressures on the perceiver: Judgments of videotaped interviews varying judge accountability and responsibility. Journal of Applied Psychology, 66 (4), 437-441.

Schadewald, M. S., & Limberg, S. T. (1992). Effect of information order and accountability on causal judgments in a legal context. Psychological Reports, 71, 619-625.

Scherer, L. L. (1985). The impact of problem structuring and identifiability on the quantity and quality of alternatives a decision maker generates. Paper presented at Midwest Academy of Management, Toledo, Ohio.

Scherer, L. L. (1989). An exploration of communicated performance expectancies and argument quality on recipient cognitive and affective responses, agreement with message, self-expectancies, motivation, intentions, and task performance. Unpublished doctoral dissertation, the Ohio State University.

Scherer, L. L., & Billings, R. S. (1986). Structuring a decision problem in terms of objectives: Inhibition or facilitation of alternative generation. Paper presented at the Midwest Academy of Management, Toledo, OH.

Scherer, L. L., Butler, A., Reiter-Palmon, R., & Weiss, R. J. (1994, November). Toward a taxonomy of reactions to ill-defined problems. Paper presented at the annual meeting of the Society for Judgment and Decision Making, St. Louis, MO.

Shine, L.C. (1982). Interpreting significant left-tailed analysis of variance F-ratios. Educational and Psychological Measurement, 42, 1045-1047.

Siegal-Jacobs, K., & Yates, J. F. (1996). Effects of procedural and outcome accountability on judgment quality. Organizational Behavior and Human Decision Processes, 65 (1), 1-17.

Stevens, J. (1996). Applied multivariate statistics for the social sciences (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.

Tabachnick, B.G., & Fidell, L.S. (1989). Using multivariate statistics. (2nd ed.). New York: Harper Collins.

Tetlock, P. E. (1983a). Accountability and complexity of thought. Journal of Personality and Social Psychology, 45 (1), 74-83.

Tetlock, P. E. (1983b). Accountability and the perseverance of first impressions. Social Psychology Quarterly, 46 (4), 285-292.

Tetlock, P. E. (1985a) Accountability: A social check on the fundamental attribution error. Social Psychology Quarterly, 48 (3), 227-236.

Tetlock, P. E. (1985b). Accountability: The neglected social context of judgment and choice. Research in Organizational Behavior, 7, 297-332.

Tetlock, P. E., & Boettger, R. (1989). Accountability: A social magnifier of the dilution effect. Journal of Personality and Social Psychology, 57 (3), 388-398.

Tetlock, P. E., & Kim, J. I. (1987). Accountability and judgment processes in personality prediction task. Journal of Personality and Social Psychology, 52 (4), 700-709.

Tetlock, P. E., Skitka, L., & Boettger, R. (1989). Social and cognitive strategies for coping with accountability: Conformity, complexity, and bolstering. Journal of Personality and Social Psychology, 57 (4), 632-640.

Upshaw, J.S. (1985). Judgment and decision processes in the formation and change of social attitudes. In M. F. Kaplan, and S. Schwartz (Eds.), Human judgment and decision processes. New York: Academic Press.

Weldon, E., & Gargano, G. M. (1985). Cognitive effort in additive task groups: The effects of shared responsibility on the quality of multiattribute judgments. Organizational Behavior and Human Decision Processes, 36, 348-361.

Weldon, E. & Gargano, G. M. (1988). Cognitive loafing: The effects of accountability and shared responsibility on cognitive effort. Personality and Social Psychology Bulletin, 14 (1), 159-171.

Weldon, E., & Mustari, E.L. (1988). Felt dispensability in groups of coactors: The effects of shared responsibility and explicit anonymity on cognitive effort. Organizational Behavior and Human Decision Processes,41, 330-351.

Williams, K., Harkins, S., & Latane, B. (1981). Identifiability as a deterrent to social loafing: Two cheering experiments. Journal of Personality and Social Psychology, 40 (2), 303-311.

Appendix A

Parking Problem

It is difficult to find a parking space at UNO. There is approximately one parking space for every two people on campus, and although this doesn't sound too bad, anyone who has tried to find a spot at 10 a.m. knows there is a problem. The park just south of the university provides additional parking spaces, but it is also filled during peak hours. Although there has been talk of building an access road to UNO to ease traffic congestion, there is concern that increased traffic through the park would be dangerous for children. In addition, large old trees would have to be cut down, and some residents have complained that some of the charm of the park would be lost if a road was built. There are plenty of parking spaces available at Ak-Sar-Ben, but students who park there must take a time consuming bus ride to campus. In addition, the university must run costly buses to and from Ak-Sar-Ben even in the late afternoon when there is only an occasional passenger. The university is sensitive to the complaints of students and would like to solve the parking problem at UNO, but state budget cuts have severely limited the funds available to handle such matters. The university does not know what to do.

Appendix B

Resolving Power (RP):Parking Problem

Essential Conflict:

The goals of the university to maintain good community relations and live within the university budget.

The goals of the students to have more convenient (hassle-free) parking so students can get to class in a timely manner.

One side of the conflict (Either university OR student goals):

Rating

1

General RP-Solution doesn't do a very good job addressing any aspects/facets of the problem.

***Parking Problem**-Solution addresses either subaspect (community relations vs budget; or more convenient parking vs. timeliness) of one side –does not do a very good job

Exemplar- Provide limousine service. (Could possibly be more convenient, but not necessarily; definitely doesn't consider budget, and may actually cause problems with community due to traffic)

2

General RP Solution addresses one aspect/facet of the problem moderately well.

***Parking Problem**- Two Possibilities:
1) Solution addresses either subaspect of one side fairly well OR
2) Solution addresses both subaspects of one side not so well

Exemplar Campaign for donations around Metro area (Addresses budget issues, may harm community relations, and can't be sure of how the student concerns would be handled with this money)

3

General RP Solution effectively addresses one aspect/facet of the problem.

***Parking Problem** Solution addresses both subaspects (community relations and budget OR more convenient parking and timeliness) of one side well.

Exemplar- Build parking lots in Elmwood park. (More convenient and less time-consuming parking, but doesn't take into account community relations or budget)

Both sides of the conflict (Both university AND student goals):

Rating

4

General RP Solution seems to attempt to address one aspect/facet of the problem.

***Parking Problem** – Solution attempts to address one subaspect of each side- does not do a very good job

Exemplar- Build a new parking lot. Charge students to help offset funding for project. (Creates more parking, but not clear how convenient or time consuming; addresses budget issues, but again not clear about community relations because it doesn't say where lot would be built)

5

General RP Solution resolves the conflicting aspects of the problem moderately well.

***Parking Problem-** Two Possibilities:
1) Solution addresses 3 subaspects (2 university, 1 student OR 1 university, 2 student) fairly well OR
2) Solution addresses all 4 subaspects (2 university, 2 student) not so well

Exemplar- We can avoid a peak time; get up early and go to school before class begins, we can park anywhere. (Maintains community relations within budget; may be reduced hassle, but is time consuming)

6

General RP Solution does a very good job resolving the conflicting aspects of the problem.

***Parking Problem-**Solution addresses all 4 subaspects of both sides well

Exemplar- If the foundation of the present parking garage is sound or needs to be made more fundamentally sound, then secure the present three floors and build another three to four floors of stalls. This could be a campus/community effort in that faculty and students work as a team. For example, have Mannheim Steamroller perform and donate the majority of the proceeds into a trust. Have several quality events and speakers and invest the monies into a secure program at a reasonable rate. (Would provide more convenient and less time consuming parking as well as maintain community relations within budget)

Appendix C
Manipulation Check Questions

INDICATE THE EXTENT TO WHICH YOU AGREE WITH THE FOLLOWING STATEMENTS. PLEASE FILL IN THE NUMBERED CIRCLE **ON THE ANSWER SHEET** BETWEEN 0 AND 9 WHICH BEST REPRESENTS YOUR LEVEL OF AGREEMENT FOR EACH STATEMENT.

1. The solutions and responses I have provided can be traced to me personally.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

2. When I thought of each of the solutions, I mentally justified each one before writing it down.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

3. The solutions and responses I have provided will be combined with solutions provided by other students, to be reviewed by the university.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

4. The solutions and responses I have given are anonymous.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

5. I alone have provided solutions to a particular problem, to be reviewed by the university.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

6. In generating solutions, I thought about whether or not my solutions could be defended as good solutions.

0-------1-------2-------3-------4-------5-------6-------7-------8-------9
strongly disagree strongly agree

Note. Questions 3 and 4 were reverse coded. Questions 1, 3, and 6 were chosen to select participants.

Appendix D
Task Instructions

All Participants

As you have just read, you have agreed to participate in a study to examine how people solve real world problems. You will be asked to generate solutions to a problem and complete several questionnaires. This should take approximately 45 to 60 minutes to complete. You are guaranteed extra credit for this amount of time; however, should the task take longer, credit will be given for this additional time as well.

Please read the following problem and write down as many solutions as possible for the problem. Take as much time as you need to provide all of the solutions that you can think of. Please feel free to reread the problem as often as you like. When you can't think of any more solutions, choose the solution that you feel is the BEST solution and circle it.

Low Identifiability, Shared Responsibility, No Accountability

The solutions you are about to provide for this problem will be strictly anonymous and not traceable to you. They will be pooled with those of other participants who are also responding to this same problem. All of the solutions generated by the study participants will be considered by UNO staff members in their attempt to solve this problem.

Low identifiability, Sole Responsibility, No Accountability

The solutions you are about to provide for this problem will be strictly anonymous and not traceable to you. A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Your solutions will be considered by UNO staff members in their attempt to solve this problem.

Low identifiability, Shared Responsibility, Outcome Accountability

The solutions you are about to provide will be strictly anonymous and will not be traceable to you. They will be pooled with those of other participants who are also

responding to the same problem. All of the solutions generated by the study participants will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to indicate the solution you think is best and provide a written justification of why you think chosen solution is the best one.

Low Identifiability, Sole Responsibility, Outcome Accountability

The solutions you are about to provide for this problem will be strictly anonymous and not traceable to you. A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Your solutions will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to indicate the solution you think is best and provide a written justification of why you think the chosen solution is the best one.

Low Identifiability, Shared Responsibility, Process Accountability

The solutions you are about to provide for this problem will be strictly anonymous and not traceable to you. The will be pooled with those of other participants who are responding to the same problem. All the solutions generated by the study participants will be considered by UNO staff members in their attempt ot solve this problem. After you have finished generating solutions, you will be asked to provide a written justification for each of your solutions.

Low Identifiability, Sole Responsibility, Process Accountability

The solutions you are about to provide for this problem will be strictly anonymous and not traceable to you. A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Other participants are working on different problems. Your solutions will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you

will be asked to indicate the solution you think is best and provide a written justification for each of your solutions.

High Identifiability, Shared Responsibility, No Accountability

The solutions you are about to provide will be pooled with those of other participants who are also responding to this same problem. We will ask you to record your name so that your status as a student can be verified. All of the solutions generated by the study participants will be considered by UNO staff members in their attempt to solve this problem.

High Identifiability, Sole Responsibility, No Accountability

A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Other participants are working on different problems. We will ask you to record your name so that your status as a student can be verified. Your solutions will be considered by UNO staff members in their attempt to solve this problem.

High Identifiability, Shared Responsibility, Outcome Accountability

The solutions you are about to provide will be pooled with those of other participants who are also responding to the same problem. We will ask you to record your name so that your status as a student can be verified. All of the solutions generated by the study participants will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to indicate the solution you think is best and provide a written justification of why you think chosen solution is the best one.

High Identifiability, Sole Responsibility, Outcome Accountability

A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Other students are working on different problems. We will ask you to record your name so that your status as a student can be verified. Your solutions will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to indicate the solution you think is best and provide a written justification of why you think the chosen solution is the best one.

High Identifiability, Shared Responsibility, Process Accountability

The solutions you are about to provide will be pooled with those of other participants who are responding to the same problem. We will ask you to record your name so that your status as a student can be verified. All of the solutions generated by the study participants will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to provide a written justification for each of your solutions.

High Identifiability, Sole Responsibility, Process Accountability

A series of problems is being investigated, but you alone are responsible for generating solutions to the following problem. Other participants are working on different problems. We will ask you to record your name so that your status as a student can be verified. Your solutions will be considered by UNO staff members in their attempt to solve this problem. After you have finished generating solutions, you will be asked to indicate the solution you think is best and provide a written justification for each of your solutions.

Appendix E

Table 14

Secondary Main Effects Analyses for Quantity of Solutions Resulting from Tests of Interactions

Source	n	SS	df	MS	F	p
1. Id X Resp	77					
Identifiability		.27	1	.27	.05	.82
Responsibility		7.53	1	7.53	1.44	.23
2. Id X Account	90					
Identifiability		.05	1	.05	.01	.93
Accountability		32.12	2	16.06	2.73	.07
3. Resp X Account	72					
Responsibility		9.41	1	9.41	1.47	.23
Accountability		14.63	2	7.31	1.14	.33

Appendix E (cont)

Table 15

Secondary Main Effects Analyses for Number of Resolving Solutions Resulting from Tests of Interactions

Source	n	SS	df	MS	F	p
1. Id X Resp	77					
Identifiability		.00	1	.00	.00	.98
Responsibility		2.74	1	2.74	1.20	.28
2. Id X Account	90					
Identifiability		6.24	1	6.24	3.77	.06
Accountability		3.58	2	1.79	1.08	.34
3. Resp X Account	72					
Responsibility		1.90	1	1.90	.88	.35
Accountability		6.09	2	3.05	1.40	.25

Appendix E (cont)

Table 16

Secondary Main Effects Analyses for Proportion of Resolving Solutions Resulting from Tests of Interactions

Source	n	SS	df	MS	F	p
1. Id X Resp	78					
Identifiability		.04	1	.04	.45	.51
Responsibility		.19	1	.19	2.42	.12
2. Id X Account	91					
Identifiability		.93	1	.93	12.90	.00
Accountability		.42	2	.21	2.87	.06
3. Resp X Account	73					
Responsibility		.25	1	.25	2.75	.10
Accountability		.02	2	.01	.10	.90

Appendix E

Table 17

Secondary Main Effects Analyses for Best Solution Resulting from Tests of Interactions

Source	n	SS	df	MS	F	p
1. Id X Resp	78					
Identifiability		2.98	1	2.98	1.81	.18
Responsibility		2.49	1	2.49	1.51	.22
2. Id X Account	91					
Identifiability		5.83	1	5.83	5.01	.03
Accountability		10.88	2	5.44	4.67	.01
3. Resp X Account	73					
Responsibility		3.80	1	3.80	2.51	.12
Accountability		13.45	2	6.72	4.44	.02

Appendix F

Three-way Interaction Cell Sizes

	Identifiability	
Accountability by Responsibility	Low	High
No Accountability		
Shared Responsibility	2	1
Sole Responsibility	3	1
Outcome Accountability		
Shared Responsibility	4	3
Sole Responsibility	5	2
Process Accountability		
Shared Responsibility	5	8
Sole Responsibility	4	3